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OCCASIONAL PAPERS

OF THE

BERNICE PAUAHI BISHOP MUSEUM OF POLYNESIAN ETHNOLOGY AND NATURAL HISTORY

VOLUME VII

HONOLULU, HAWAII
Bishop Museum Press
1922

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BERNICE PAUAHI BISHOP MUSEUM OF POLYNESIAN ETHNOLOGY AND NATURAL HISTORY

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Vol. VII—No. 1.
With Plates I-II.

Director's Report for 1918

HONOLULU, HAWAII
Bishop Museum Press
1920

Bernice Pauahi Bishop Museum
1918

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Otto H. Swezey	Honorary Curator of Entomology
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OF THE

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Vol. VII—No. 1.
With Plates I-II.

Director's Report for 1918

HONOLULU, HAWAII
Bishop Museum Press
1920

Director's Report for 1918[1]

The retirement of Dr. William T. Brigham as Director of the Bishop Museum, foreshadowed in his annual report for 1917, took place at the beginning of the present year. By vote of the Trustees, he was given leave of absence for the year 1918, and appointed Director Emeritus and Curator of Anthropology beginning with the year 1919.

Dr. Brigham's retirement as the active head of the museum after nearly 30 years of service is regarded with regret by those under his direction, as they appreciated the helpful interest he displayed in their work. The advantages of his many accomplishments and wide experience, he was always ready to share with his assistants, while his courtesy and consideration are among the characteristics that have endeared him to them. It is a matter of great satisfaction, however, to those formerly under Dr. Brigham's charge, that his valuable services have been recognized by the Trustees with the title of "Director Emeritus" and that his association with the Museum will continue.

During Dr. Brigham's leave of absence, and pending the appointment of a new Director, Mr. John F. G. Stokes, Curator of Polynesian Ethnology, was requested to assume administrative responsibility for the Museum, with the title of Curator in Charge.

Before leaving for the mainland on his well-earned vacation, Dr. Brigham was able to make another contribution to the study of Hawaiian featherwork, which included all the information he had gathered up to date. This was published as Memoirs Volume VII, No. 1, Second Supplement Hawaiian Featherwork. He also completed his Annual Report for 1917, which was, as usual, published in Occasional Papers.

The first Territorial Fair, conducted largely as a food conservation measure, took place in Honolulu in June. The Museum was invited to exhibit from its extensive collection of fruit and fish casts. As no provision was made for the protection of fruit casts from being handled by the public, this portion of the exhibit was withdrawn. For the fish section, however, casts of thirty of the largest edible fishes, especially of those somewhat neglected by the fish-eating public, were selected and exhibited in the rotunda of the Aquarium, where they showed to far better advantage than in the Museum cases. As the Aquarium (which was made part of the Fair) was able to exhibit only the smaller species in its tanks, the combination with the Museum contribution made a very comprehensive exhibit.

---

[1] The Director's Report for 1918 was prepared by John F. G. Stokes, Curator of Polynesian Ethnology.

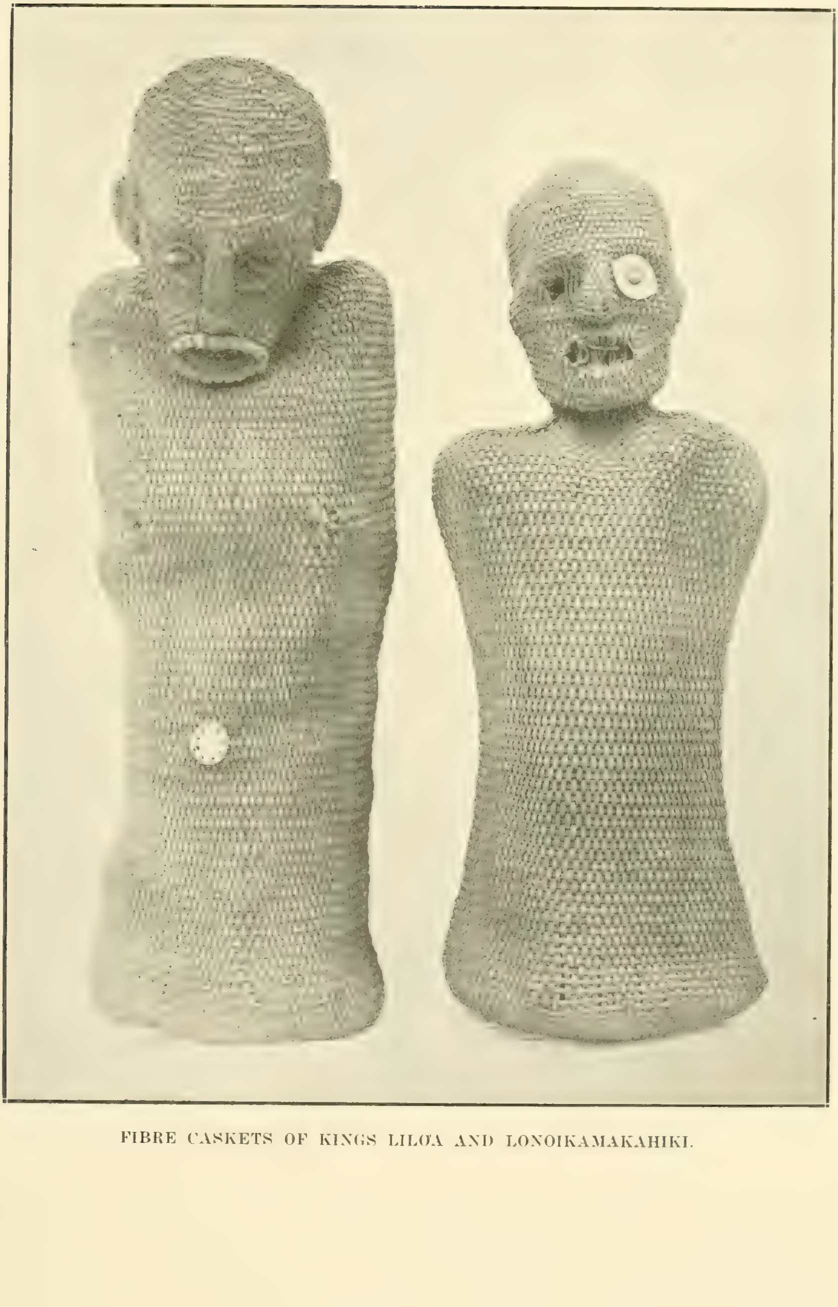
Attention is drawn to twelve enlarged photographs of the fire-pit of Kilauea Volcano which have been mounted and displayed in Hawaiian Hall, in front of the model of the Volcano. The plates were selected by Dr. T. A. Jaggar, Director of the Volcano Observatory, to illustrate the successive changes in the fire-pit during a period of a year and a half. Their educational value has been further enhanced by the descriptions written by Dr. Jaggar.

During the latter part of the year, the unusually severe wind storm, which did much damage in Honolulu, made itself felt on the Museum buildings. The stone and concrete portions of the structure were unaffected, but the skylight of the photographic studio was broken in, and the crestings of the exhibition building carried off.

A very satisfactory evidence of the progress of the Museum in the estimation of Hawaiian people, was given during the year when the bones of two of their kings were placed in the Museum in order that the remarkable workmanship of the caskets might be studied to advantage. (See p. 5 and Pl. I.) Remains of Hawaiian kings having always been regarded with the greatest veneration by their subjects (a veneration that very properly continues among Hawaiians living today), the recognition of the purposes of the Bishop Museum, and the confidence shown by this action, is not only a matter of gratification to the institution, but indicates an intellectual keenness and an appreciation of scientific knowledge on the part of the Hawaiian people not equalled so far by any other race.

ETHNOLOGY.

Mr. J. F. G. Stokes, the Curator of Polynesian Ethnology, reports:



FIBRE CASKETS OF KINGS LILOA AND LONOIKAMAKAHIKI.

The number of ethnological accessions during the year was 365, classified as follows: gifts, 180; purchases, 126; loans, 15; gifts of relics, 44. This is less than the average for the preceding five year period, in the early part of which large collections were made, given and purchased.

GIFTS.

Mr. Bruce Cartwright, Jr., presented an accumulation of small loans made by him from time to time and amounting in all to fifty-two specimens; Judge S. B. Dole—one of the rare Neckar Islands stone idols, which makes a total of nine now brought to light; Judge H. E. Cooper—a tobacco pipe, apparently of slate, which was dug up in Manoa Valley, Oahu, the same valley in which an Indian arrow head was found many years ago.

The *wa'u ipu* (scraper of cowry shell) lost sight of until 1916 when specimens of it were found by Messrs. Judd and Cooke on deserted house lots on Molokai (described in Occasional Papers Vol. VI, p. 232) has now been turned up in great numbers, as shown by the gifts of Messrs. Judd and Munro.

Another gift worthy of special mention (although outside the province of the museum) was a collection of Moro weapons captured by men of the Twenty-fifth Infantry, U. S. A., in the Philippines. It was presented by the men of the regiment when vacating their station at Schofield Barracks, Oahu.

LOANS.

Among other things deposited in the Museum by the various interests concerned, were two cocoanut fibre caskets (Pl. I), believed to contain the bones of Liloa, king of Hawaii about 1500 A. D., and Lonoikamakahiki, a great grandson who reigned later. Examples of this form of body encasing have not been observed before and undoubtedly are extremely rare. They will be described in a later publication.

A feather cape (Pl. II) and three *lei* (ornamental strings of feathers) which were taken to New England in 1822 by Mrs. Lucia Ruggles Holman, one of the earliest missionaries, were lent by the present owner, a descendant. The cape was given by Queen Kaahumanu to Mrs. Holman, probably for her daughter, claimed to be the first white child born in the Hawaiian Islands. It is remarkably well preserved, the feathers showing very little wear. The colors are yellow (oo), red (iiwi,) and black (oo), and the measurements are: length of back, 355 mm.; length of fronts: right 272, left 260; greatest width 820.

PURCHASES.

A collection of stone implements made by Mr. H. Schultz, during his residence of a quarter of a century on the island of Kauai, was the most important purchase of the year. It consisted of eighty-five items, which brought several new forms to our knowledge.

RELICS.

During the year two royal standards were received, for each of which was claimed the distinction of being the royal standard lowered at the overthrow of the Hawaiian monarchy in 1893. One was given by Mr. A. A. Brown of San Francisco, and the other by Mr. George E. Smithies of Honolulu. The flags are of similar design but differ in other respects. In the hope of establishing the identity of this historical specimen, inquiries have been made among persons who witnessed the revolution, but with no definite results.

Mr. Smithies also presented, in the name of his wife, many other relics including the sword of his late Majesty Kalakaua. Mrs. Smithies was the daughter of the late Colonel Samuel Nowlein, who commanded the body guard of the Queen, at the time of her deposal.

Acknowledgments of gifts have been sent to Mesdames C. M. Cooke and C. N. Forbes; Messrs. L. J. Bouge, A. A. Brown, Bruce Cartwright, Jr., C. Montague Cooke, Jr., C. M. Cooke III, H. E. Cooper, S. B. Dole, A. F. Judd, James Munro, R. Nui, G. W. Paty, A. Perry, J. W. Pratt, H. Roberts, W. S. Rycroft and G. E. Smithies; the Hawaiian Evangelical Association and the Twenty-fifth Infantry, U. S. A.

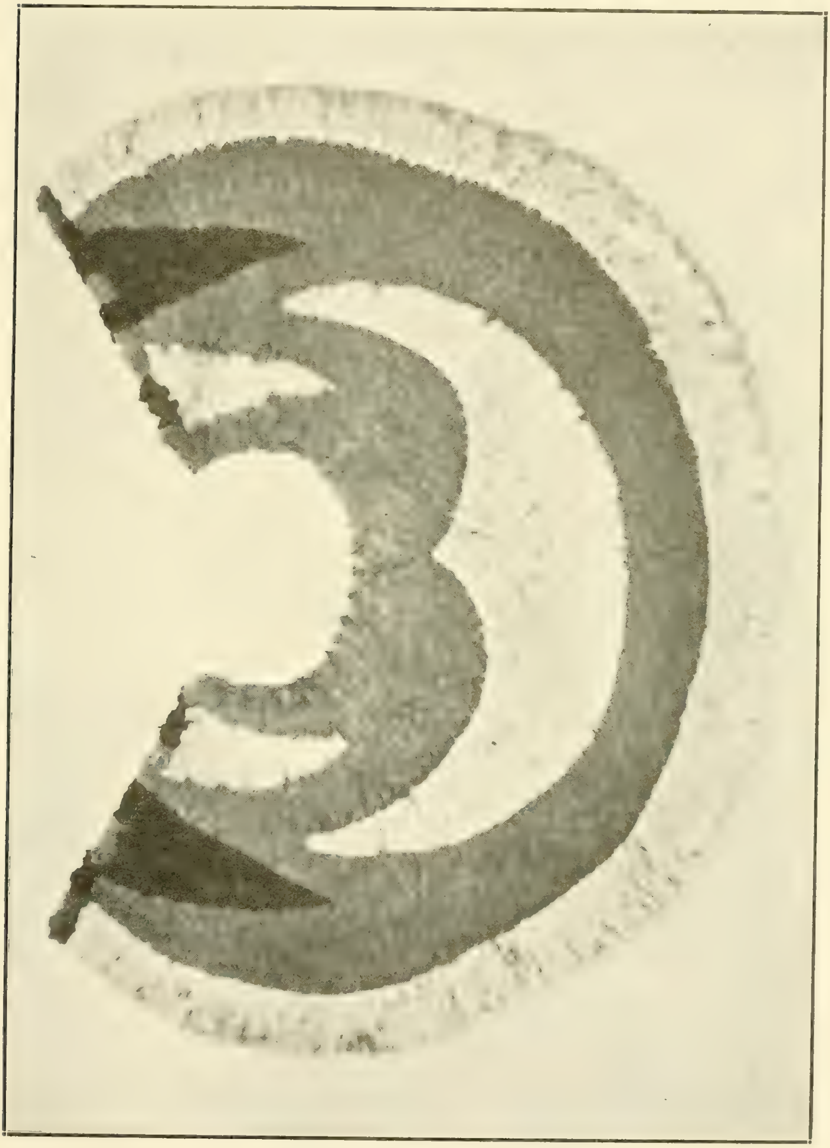
While Prof. J. Macmillan Brown, vice-dean of the University of New Zealand, visited the Hawaiian Islands, to continue his Polynesian researches, it became the good fortune of the curator of ethnology to conduct the noted anthropologist to various parts of the island of Oahu.

PULMONATA.

Dr. C. Montague Cooke, Curator of Pulmonata, reports for his department as follows:

During the past year, fewer shells have been added to the collection than in any year since the curator has been employed by the Museum. The reason for this is that a little more than half of the year was spent in preparation of a manuscript dealing with the Hawaiian Pupillidae. The whole of the Museum collection of our species belonging to this family (catalogued up to December 31, 1917) has now been classified and arranged. A large number of new species was found in the collection, as about two-thirds of the species and varieties dealt with are new. The manuscript has been slightly enlarged by Dr. Pilsbury and will appear shortly in the Manual of Conchology.

Five thousand one hundred and ninety-eight (5198) specimens were catalogued during the year. These specimens are distributed in five hundred and sixty-seven (567) catalogue numbers. Specimens have been received from the following: Mrs. G. W. Bryan, Miss M. Burbank, Miss M. Clough, Messrs. J. S. Emerson, C. F. Mant, A. Gouveia, J. C. Bridwell and E. R. Davis.



THE HOLMAN FEATHER CAPE.

Dr. Cooke also prepared in the early part of the year, a preliminary catalogue of the Lepachatinae and Tornatellinidae in the Bishop Museum. The paper, while illustrating the extent of his work in these families, serves the wider purpose of a check list of the species, and an indication of their distribution. The catalogue appears in Occasional Papers, Volume VI, Number 5.

It might be mentioned that the rapid expansion of the collections in this curator's charge, had so limited the space for the reclassifications made from time to time, that an additional room was assigned to him—the room that had been used for instruments.

BOTANY.

The report of the Curator of Botany, Mr. C. N. Forbes, covers a period of two years, 1917 and 1918. Mr. Forbes observes that 1917 was exceptionally dry on most of the Hawaiian islands, with the exception of Lanai, and was, on this account, a very favorable year for the botanical collector. On Kauai, during July and August, the section west of the Waimea River, covering a large portion of the country near the Kokee stream was explored.

> The region is so extensive and so cut up into numerous ridges and gulleys, that it was hardly more than skimmed over in the time that I was there. The lower ridges represent one of the dryest habitats on the island of Kauai, while the vast dissected upland plateau known as the Alakai Swamp is a region of perpetual rainfall. In a region of such diversified habitats, the flora is naturally very rich and varied and possesses additional interest as being the type locality for most of the species collected by Valdemar Knudsen and described in Hillebrand's Flora, and also many of Wawra's species. I received much kindly help from Hon. E. A. Knudsen, and through his assistance covered more territory than would otherwise have been possible.
>
> During September a short visit was made to Lanai as the guest of Mr. G. C. Munro. Under Mr. Munro's system of plowing and seeding paddocks, coupled with unusually rainy weather, the country was quite green. Owing to the decrease in the number of wild goats, the forest undergrowth on the main mountain was much thicker than on my last visit in 1912. I was especially fortunate in being able to find a single specimen of *Hesperomannia arborescens* in its type locality. Part of September and the month of October were spent on Maui, in Honokohau valley, where I camped at the in-take of the plantation irrigation ditch. Several trips were made to the summit of Eke, a small isolated crater with a peculiar and very interesting bog flora. The flora of the valley itself showed the effect of an unusual drought. A fern, *Dryopteris cyatheoides,* which was very common

on the steep sides of the gulch, hung down in dry festoons, while even patches of the comparatively semixerophitic *Gleichenia linearis* were withered in places. Trees showed varying degrees of resistance, species of *Straussia* apparently suffering the most. Many thanks are due to Mr. David Fleming for permission to camp in the valley.

The most notable acquisition to the herbarium was a collection of plants named by Hillebrand, already mentioned in the Director's Annual Report for 1917.

Returning in the latter part of September, 1918, after nine months leave of absence, the greater part of Mr. Forbes' time was occupied by the routine work which had accumulated. With the aid of a temporary assistant the bulk of the material has been poisoned, and much of it mounted. A brief monograph on the Genus Lagenophora was published with Occasional Papers Volume VI, Number 5.

The accessions to the herbarium for the two years are as follows:

1917.

A. S. Hitchcock, U. S. Grasses by exchange	104
C. M. Cooke, Oahu	8
J. C. Bridwell, Oahu	6
H. Graves, U. S. by exchange	13
G. C. Munro, H. I. purchase	134
J. W. Thompson, Oahu	1
D. Thaanum, U. S.	25
J. M. Lydgate, Hillebrand collection purchase	589

CURATOR'S COLLECTION

Oahu	316
Kauai	2765
Lanai	597
Maui	1300
Total	5858

1918.

Mrs. A. H. B. Judd, teratological papaia	1
Bureau of Science, Manila, exchange	247
G. C. Munro, Lanai and Maui	33
E. L. Caum, Maui	2
J. F. G. Stokes, teratological papaia	1
A. D. E. Elmer, Philippine Islands, purchase	1318
J. R. Weir, U. S.	13
Total	1615

ENTOMOLOGY.

The Honorary Curator, Mr. O. H. Swezey, has been much handicapped through the departure of Mr. Bridwell, his former assistant in the Museum. Mr. Swezey has comparatively little spare time to devote to collections of the Museum, nevertheless he has been able to increase them during the year by 1260 specimens, comprising 415 species. The courtesy of his employers, the Hawaiian Sugar Planters' Association, in permitting him to take the honorary position and to devote certain hours to the work of the Museum, is very highly appreciated. The Honorary Curator reports that all of the Helms collection has been placed in the Museum cabinets, with the exception of the New Zealand Coleoptera yet remaining to be transferred from the old boxes containing them on arrival.

The Hawaiian insects formerly in the gallery of Hawaiian Hall have been removed to the metal cases, so that now they are convenient of access for reference or study.

During the year many insects were collected in the native forests and prepared for study. The localities and the approximate number of specimens and species follow:

	Specimens	Species
Iao Valley, Maui, August 8th	200	70
Haiku, Maui, August 27th	60	15
Haleakala, Maui, August 25th, 26th and 29th	300	70
Kaiwiki, Hawaii, September 22nd	260	75
Palolo and Mt. Olympus, Oahu, October 20th	160	60
Pacific Heights and Kaumuahona, Oahu, Nov. 17th	60	35
Lanihuli Ridge, Oahu, November 24th	120	40
Kuliouou, Oahu, December 22nd	100	50
	1260	415

This material includes many species not hitherto represented in the collection, also a number of species not previously collected or described.

When time or circumstances make it possible to work up this material in connection with the 3250 specimens collected by Mr. Bridwell in 1917, it will make a beginning towards supplying the species lacking in the Hawaiian collection, which contains but 64 per cent of the number of species listed in the Fauna Hawaiiensis.

In February, 1918, the para-types of the Hawaiian Heteroptera were lent to Mr. E. P. Van Duzee, Curator of Entomology of the Museum of the California Academy of Sciences, San Francisco, for his assistance in working up the Hawaiian Heteroptera in the collections of several persons and institutions of Honolulu.

LIBRARY.

The Librarian, Miss E. B. Higgins, reports an unprecedented number of newspapers in the native language received from various sources during the year.

Until the beginning of the twentieth century, the vernacular newspapers comprised almost the sole native literature published, and they covered a transition period in native life but lightly touched upon by foreign observers. Being also the means of the natives' exposition of their own customs and folk-lore (although their intellectual leaders were educated and inspired by foreigners) the Librarian has made many efforts during the past few years to complete the early files. The largest contribution so far received came this year from the basement of Kawaiahao Church in Honolulu, from which thirty-four sacks and thirty-nine trunks of papers and native school books were taken. These were cleaned and sorted, and the duplicates—the greater bulk—were returned.

A smaller accession yielding greater proportionate results was the purchase of the files of a native minister which included in addition to many other fragmentary sets the following thirty-five complete or nearly complete volumes: Ka Nupepa Kuokoa, 24; Ke Aloha Aina, 2; Ka Makaainana, 7; Ka Loea Kalaiaina, 2.

Local periodicals are now represented in the Library by seventy-five titles, classified as follows: English, 41; Hawaiian, 32; Portuguese, 1; Chinese, 1; the earliest date is 1834.

The files of scientific journals have been added to by purchase, gift and exchange, but numerous vacancies were still left as many parts and numbers were out of print. The lack was partly supplied by approaching the contributing authors—a mode suggested by Dr. Herbert E. Gregory on a visit early in the year. Twenty-one journals were added by subscription.

The distribution of scientific journals in the Museum Library, is approximately as follows:

Archaeology, anthropology and ethnology	41
Natural History	38
Botany	15
Conchology	1
Zoology, General	26
Ornithology	2
Mollusca	2
Microscopy	1
Geography	6
General Science	15
Geology	7
Museums	11
Miscellaneous	9
	174

The following institutions have been added to our list of exchanges: University of Chicago; University of Illinois; Newark Museum; Société d'Etudes Océaniennes.

This last named society has been recently formed in Papeete for the study of the Pacific.

Acknowledgment of author's separates, and other items, is made to the following: Messrs. L. J. Bouge, C. Montague Cooke, Jr., W. M. Giffard, Ivan C. Hall, A. F. Judd, Vaughan MacCaughey, Sidney Powers, T. G. Thrum and Harold Wright, and the Hawaiian Association through Mrs. R. W. Andrews.

A miscellaneous lot of books and pamphlets was purchased from the Rowell Estate—50 titles, including some duplicates. Among them were MS notes on the Hawaiian Bible, 1843, by Rev. G. B. Rowell.

Summary of accessions for the year is as follows:

	Volumes	Parts and Pamphlets
Exchange	181	411
Purchase	170	217
Gift	13	56
Total	364	684

Grand Total—1048.

This summary excludes incomplete volumes of local newspapers received, dating from 1846 to 1918, and representing 65 volumes and 47 titles —19 English, 27 Hawaiian and 1 Portuguese.

More than 200 volumes have been prepared for the binder; of these 165 volumes have been bound.

MODELING.

During the year, Mr. Thompson, Artist and Modeler, finished 70 models: 16 of fishes, 1 of a mammal, 16 of fruits, and 37 of ethnological specimens. He has 21 unfinished models on hand. He has also painted and prepared three coconut crabs from Fanning Island. An excellent representation was secured of a porpoise 7 feet, 7 inches long, weighing 375 pounds.

EXHIBITION HALLS

Mrs. Helvie, Superintendent of Exhibition Halls, reports that the attendance of visitors has kept up very well in spite of the lack of tourists—the military visitors from the various posts being greater than usual. The total attendance for the year was 14,029, a decrease from 15,145 the average for the five previous years. The daily average was 54.4,—the halls having been open for 258 days in the year. The attendance by months, and classified according to race, is given in the accompanying table. The total includes 1367 pupils, representing 46 classes from schools in Honolulu.

TABLE OF ATTENDANCE.

1918	Whites	Hawaiians	Portugueses	Chinese	Japanese	Others	Days Open	Average	Total
January	625	163	76	75	256	10	22	54.8	1205
February	787	117	111	148	241	10	20	70.2	1414
March	602	88	47	72	220	19	22	47.7	1048
April	561	194	64	80	193	14	22	50.2	1106
May	442	221	77	100	1087	44	21	93.9	1971
June	410	92	109	102	201	14	21	44.2	1928
July	584	59	81	62	108	20	21	43.5	914
August	491	91	58	76	212	24	23	40.2	952
September	555	239	97	90	268	45	21	60.2	1294
October	426	181	98	118	196	11	22	46.9	1030
November	408	130	72	105	273	33	21	48.7	1021
December	561	292	29	70	191	3	22	52.1	1146
Totals...	6452	1867	919	1098	3446	247	258	54.4	14029

The steel feather-cloak case, ordered closed by the Trustees at the beginning of the year, was reopened in December for semi-monthly exhibitions of half an hour each, under the charge of Mrs. Helvie.

The establishment of a War Saving Stamp sub-agency in the halls was a great success.

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BERNICE PAUAHI BISHOP MUSEUM

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OCCASIONAL PAPERS

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BERNICE PAUAHI BISHOP MUSEUM OF POLYNESIAN ETHNOLOGY AND NATURAL HISTORY

Vol. VII—No. 2.

The Languages of the Pacific

By

J. MacMillan Brown

HONOLULU, HAWAII
Bishop Museum Press
1920

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HONOLULU, HAWAII
BISHOP MUSEUM PRESS
1920

The Languages of the Pacific[1]

By J. Macmillan Brown

ONE of the fallacies that dog the science of language is that there are three types of language, isolating, agglutinative and inflectional, separated strictly from one another. It was one of the too early generalisations of Max Müller who, coming from Germany with a knowledge of Sanskrit, ruled with absolute authority the science of philology in the English speaking world during the latter part of the nineteenth century. This theory together with the idea that all classical myths have a philological origin, is now discounted. It is found that almost all languages have some trace or relic of each type.

The Chinese is taken as the typical instance of the isolating language; each word may be used in various grammatical relations without any formal element to indicate these relations. But modern English has become practically an isolating language with only particles to indicate these relationships and a few relics in the pronouns of the old inflectional system. Polynesian is on the same footing; a word may be a noun, a verb or an adjective without any distinctive formal mark; and particles indicate the relationship, whilst in the pronouns, as in English, there remains a few relics of inflection. The Japanese is the Pacific Ocean language that best illustrates the agglutinating type. The formal elements retain so much of their original independence that adverbs and honorific words may be thrust in between them and the words they pilot grammatically. But the language has much that may be said to be inflectional and has some trace of the isolating. English, likewise, shows a tendency to the agglutinative in, for example, the frequent separation of the formal *to* of the infinitive by an adverb, or even a phrase, from the verb. So in Polynesian the *ia, a,* that added to the verb makes the passive, shows in some groups a tendency to assert its independence and be separated from its verb. Of the inflectional type the best instances are found in the Indo-European tongues. Latin is highly inflectional, Greek still more so, and Sanskrit most of all. In Polynesian the inflections of the dual and plural personal pronouns still reveal their origin; the dual of the first person is *maua* or *kaua,* of the third *laua;* here the addition of *ua* is evidently for the numeral *lua;* the plural of the first is *makou* or *kakou* and of the third *lakou;* this again shows its origin in *kolu,* three. These inflections for the plural were manifestly formed at a most primitive linguistic stage when the ancestral speakers of Polynesian did not count beyond three; one and two were definite, three was all beyond, the indefinite. This must have been before they launched out into the Pacific, for there for the first time they counted up to five; *lima* for five is practically universal in the so-called Malayo-Polynesian languages; but they had been able to count up to four before they left the sphere of influence of the Indo-European languages. "One" varies most of all the numerals. Polynesian *rua* for two is the Latin *duo,* English *two;* for the sound-law that makes *l* or *r* and *d* interchangeable existed as strongly in early Indo-European as it does in Polynesian and Malay. Latin *lacryma,* Old Latin *dakruma,* is Greek *dakru,* Gothic *tagra,* Anglo-Saxon *teagor, tear.* Polynesian *toru* or *tolu* is the uncontracted form of Latin *tres,* German *drei,* English *three;* whilst Polynesian *wha,* four, is Latin *quatuor,* Sanskrit *catvar,* Anglo-Saxon *feover.* There is no trace of "five" in Polynesian or of *lima* as a numeral in any Indo-European tongue. Yet the Polynesian must have retained some consciousness of the old European for *one,* (Latin *unus,* Old Latin *oinos*), for in counting on the second hand, *six* is *ono,* i. e., number one of the second hand. *Whitu* for "seven" retains a trace of "septem" (from sa-pita). It is probably a modification of *"whiti,"* to cross over, Hawaiian *hiki,* to come, to rise, just as *"tres"* is from *"tara"* to cross over. The Polynesian forms for *eight (waru)* and *nine (iwa)* belong to that by no means uncommon method of counting from the highest number counted downwards by subtraction; thus e. g. the numbers between *five* and *ten* in Yap are *ten* minus one, two, etc., which may be compared with the Roman numeration IV, IX, XL, XC. Malay also expresses 99, 98, 97, etc., by "hundred minus 1, 2, 3, etc." *Wa* is a common Polynesian word for interval or "space between"; 8 *(waru)*=10—(space between or minus)*2*, 9 *(iwa)*=one—from 10. *Lima,* the word for five, is not without trace in European, though not as a numeral. There is a European root form, *"rima,"* meaning *"row, numbers, verse."* In Old Norse *rim=calendar, verse.* In old Irish *rim=number.* In Old High German *Rim=row, number,* German *Reim=*English *rhyme.* Compare the Greek *arithmos,* a number, *neritos,* countless. It is from the same root as *ra,* to arrange, to fit, Latin *reri,* to think, *ratio, read, reckon, hundred.* The original form is *ra,* Maori *rarangi,* line, rank, row. The *ri* form is seen in *whakarite,* to arrange, put in order, Hawaiian *like,* to be like. Many of the languages use *lima* not only for *"five"* but for *"hand,"* evidently meaning "the counter," but in Maori and Fijian the word for hand is *"ringa,"* implying that *"ma,"* was felt to be an affix, just as *nga* is. We may say then that the Polynesian ancestors were only feeling their way up first beyond three and then beyond five. They were feeling their way towards *"tekau"* which first meant *"the company," "the lot,"* and, when they counted beyond, came to be "ten" or in some "eleven." (Compare *kau,* company, lot,=*ngahu-ru,* Gilbertese *tengaun*=10, Tongan *u*=bundle, *kehui,* flock.) The Hawaiian *"umi"* easily meant at first "the measure." The usual Polynesian *ngahuru,* for *"ten,"* becomes in Malay *"sapuloh"* by prefixing *"sa"*=one, to *puloh,* equivalent to *huru,* the hair. *Sapuloh* means the bunch of hairs, *nga,* the plural article in Maori, being replaced by *sa,* and *huru,* brushwood, coarse hair, in English "wool."

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The true classification of linguistic affinities is not by their grammar, but by their phonology, i. e. the range of sounds and sound laws that belong to them. The organs of speech do not change unless the climatic environment is changed, or the mothers. To shift from the temperate zone to the tropics relaxes all the tissues, including the tissues of the speech organs; to shift in the opposite direction gives them greater tensity and vigor. And if at the age of the moulding of a man, i. e. from infancy to seven years old, he is set in a different speech-environment from that of his ancestry his speech organs will be different. It is the mother or nurse that creates the phonological capacity of a man or woman. The speech organs are set practically for life during the first seven years, the period when it is the mother that is the dominant influence.

If therefore there is a difference between the Polynesian phonology and that of those to the west of it we may assume that it was a change of mothers that caused it; for right through the seven thousand miles from Tonga to the coast of India the climatic environment is practically the same, moist heat governed by regularly blowing winds.

Now the phonology of the Polynesian dialects differs by a whole world from that of all the languages to the west of it. The former have only twelve to fifteen sounds, the five vowels and seven to ten consonants, the most primitive outfit that any language in the world has. As soon as you step out of Polynesia westward, say from Tonga to the neighboring Fiji, the language has from twenty to thirty sounds, and this holds right to the coast of India and all through India. Further, there are sounds to these languages to the west that no Polynesian could by any training be made capable of pronouncing, nay that no European could, i.e. the speech organs are absolutely different in the two regions. One instance is the *q=kpw* of Melanesia. But the fundamental principle that divides Polynesian phonologically from all to the west is that it must close a syllable or a word with a vowel, and it cannot pronounce two consonants together. All the languages to the west can not only close a word with a consonant, but many of them (including Malay) prefer to do so. The only two languages in the Pacific Ocean that have the same phonological laws are Japanese, away to the northwest, and Quichua, away to the southeast; but the former is grammatically of a different type, the agglutinative, and the latter, though almost grammarless, like Polynesian, has inflections only in the pronouns, including the strange Polynesian characteristic of a different form in the first person for the plural that includes those spoken to and the plural that excludes those spoken to. I have found but a small percentage of Quichua words or roots the same as in Polynesian, while the range of sounds in Japanese is nearly the same as in Polynesian.

There is one other characteristic of Polynesian phonology that almost puts out of court the accepted theory that the Polynesian languages came from India or the Malay archipelago. They are divided into *l* languages and *r* languages. In Polynesia *l* has a little of the trill of the *r* and the *r* has somewhat of the liquidity of of the *l* so that it is easy for one to pass into the other. But the southern groups have a preference for the *r* sound, so that the missionaries have always written this consonant in their language as *r*, whilst the northern have a preference for the *l* sound; these are Tonga, Samoa, Futuna, Tokelau and Hawaii; all the rest except Marquesas use *r;* that group has a rule neither *r* nor *l*. If we step out of Polynesia and go west, every language uses both *r* and *l*. I should like to have explained to me how, if the Polynesian languages came east into the central and eastern Pacific, they were able to divide off the *l* speakers and the *r* speakers after coming through seven thousand miles of languages that used both *r* and *l*. Undoubtedly in the now submerged fatherland, Hawaiki, probably lying well to the south of the equator and to the east of Samoa and Tonga and the Tokelau group, the peoples in the north and northwest of it preferred the *l*, those in the south and southeast preferred the *r;* though the preference had not grown as pronounced as it is now, it had been made perhaps through that contradictoriness which dictates the fashions of neighbors, probably more pronounced because the northern tribes were nearer the equator and preferred the sound that needed less tensity and energy in the organs of speech. That Hawaiki was to the east of Samoa and Tonga is evident in the fact that the spirit land of the two groups is not *Hawaiki,* but Bulotu, which is probably from the Fijian *bulubulu,* the grave, and *bulu,* the abode of departed spirits, modified by the Polynesian *purotu,* pure, pleasant, agreeable, soft, delicate, beautiful. *Burotu* is in Fiji the residence of the gods and the place of spirits; so it is in Samoa and Tonga. Next to the northern tribes of Hawaiki must have lived the Tahitians, for they, like the Samoans and Hawaiians, eliminated the guttural *k* that had come with the primeval Polynesians from the colder north and continued in all the languages that, like those of Tonga, the Maoris, the Paumotus and the Austral Islands, Mangareva and Easter Island, drifted further south into a colder zone. But, to show the influence of climate on the organs of speech, the Hawaiians, when they got up to the borders of the temperate zone, though they did not restore the primeval *k,* began to substitute for it the *t* of all the other Polynesian dialects. The Marquesans had already begun on Hawaiki to avoid the rolling *r* and the liquid *l* and when they reached the steep-to islands in which they afterwards settled, they almost though not quite completed the process; there are only a few words in their language that retain the *r*. They also showed the same tendency as the Hawaiian to substitute *k* for *t*, though the tendency did not proceed to the full length of the northern language. *Kaoha* is the Marquesan salutation equivalent to the Hawaiian aloha. Yet the *k* sometimes disappears in Marquesan; for it is only from eight to ten degrees south of the equator and has sufficient moist heat to create languor in the organs of speech.

Thus we have in the different branches of this, the most primitive of languages, fully developed a phonological law as strict as Grimm's Law amongst the Indo-European and far wider in its application; it dominates not merely the explosive consonants, *(t, p, k)* as in the Indo-European language, but the liquids and sibilants, *r, l, s, sh* and *h*, and even the nasal consonants, *n, ng*. If we know the form that a word common to most takes in any one of the Polynesian languages, we know the form it takes in every other, provided we know this strict sound law. There is one exceptional sound, *ch* or *tz*, which appears in Tongan and Moriori, whilst Tongan has a *b* instead of the usual *p*. This must be due to the long intercourse of Tonga with Fiji which had a phonology more Melanesian than Polynesian. Strangely enough this *ts* sound also belongs to Japanese, whilst the *ch* form of it belongs to Ainu. But *b* is purely Fijian and is in fact in that language *mb*.

This regularity of consonantal change in the various dialects of Polynesian is a characteristic that completely differentiates it from all those to the west, the Micronesian and especially Papuan and Melanesian. In these there is phonological chaos in their relationships. As a rule neighboring villages in Melanesia and Papua cannot understand each other's language though only a few miles apart, whilst the Maori can understand the Rarotongan or Tahitian or Hawaiian after a brief acquaintance with the consonantal changes. And in Hawaiki this tendency to consonantal decay must have been widespread, the change that is complete in one or more of these groups occurs sporadically in all the rest. Take as an example the loss of *k* which is universal in Tahitian, Samoan and Hawaiian. In Maori it is quite common to find two words meaning the same, one with the *k*, the other without it; two or three will suffice, *kapo,* to snatch, and *apo,* to grasp; *kita,* tight, fast, and *ita,* tight, fast; and *koti,* to cut, and *oti,* finish.

Fornander points out how some, if not all of these, are paralleled in the Indo-European languages. The substitution of *s* in Samoan for the *h* of the other dialects occurs also in Sanskrit, Latin, Gothic, Iranian, Greek and Cymric. The change of *ng* of Samoan, Maori and other southern dialects into *n* in Tahitian and Hawaiian has its parallel in the substitution of *n* in Slavonic for the *ng* of Sanskrit, Zend, Latin and other European tongues. The *r* was interchangeable with *l* in Indo-European as in Polynesian, and both were often changed into *d* in both linguistic spheres. It is not infrequent to find roots in both spheres that have forms with and without the *r* or *l,* with and without the *k,* and with *t* for *k.* Further I have found in my analysis of Polynesian roots and words that *m* and *t* are moveable prefixes like *h,* e. g. *moti,* finished, and *oti,* finished; *manumanu,* rotten, and *anuanu,* disgusting; *tua,* the back, and *ua,* the backbone; *toretore,* to split into strips, and *hore,* to split off; *tu,* to be strong, to stand, and *u,* to be firm; *tuhi,* to tattoo, and *uhi,* the puncturing instrument. This occurs also in Indo-European roots. In fact, as Fornander points out, the primitive Aryan language must have had exactly the same range of consonants as Polynesian and though the process was not carried so widely among the vowels, the decadence and interchange of consonants had begun. The homeland of the primeval Aryan is now accepted as in Europe between the Baltic and the Black Sea, and that was a cold region in which the organs of speech were capable of different consonantal sounds; whilst the environment of Polynesian after it reached the Pacific was tropical and exactly suited to the decay of the consonants.

But the vowels in Polynesian, though not so unstable as the consonants still tend to interchange mutually, especially in the unaccented syllable. A few instances will suffce; *keo,* or *kea,* white; *imu, umu* and *oma,* oven (here $i = o = u$ and $u = a$); *tohunga* in Maori, *kahuna* in Hawaiian and *tufunga* in Tongan and Samoan; Hawaiian *anoni* and *anune,* to mix up; Hawaiian *api,* the beating of the pulse, and Maori *kakapa,* to throb; Hawaiian *weo* and *wea,* red; Hawaiian *culu,* a branch cut off to be planted again, Maori *huri,* a sprout, and Hawaiian *huli,* kalo tops for planting; Hawaiian *io,* to flee from fear, and Maori *ihi,* to shudder. So the double vowel *au* passes into *o* and *ae* passes into *e*. As I have proceeded in my analysis of the Polynesian languages, I become more and more astonished at the traditional statement that the Polynesian vowels are stable. What I should stay is that they are only a little less unstable than the consonants, without any method or law in their instability; they are capriciously unstable whilst the Polynesian consonants change according to a fixed law. The most stable of the vowels and the most predominant is *a*. Likewise in Indo-European, there are ten roots in *a* for one in each of the other vowels. It is almost as strong in Polynesian. In other words *a* was the primeval vowel in both Indo-European and Polynesian; the others are but variations from it, the commonest series being *a, e, i* and *a, o, u*. But the Indo-European tongues, as they have shifted away from their birthland, have become more and more consonantal, which means that they have changed their climatic environment or the mothers of the generations. This increase of consonantalism has arisen largely from the elision of vowels. Thus it has come about that double consonants are fairly frequent, especially *s* with the other consonants. I fancy that this has come about through using an emphatic prefix *sa* and then dropping its vowel. Take, for example, the root *skar,* to cut, and *kar,* English shear, in Latin *curtus,* mutilated, Anglo-Saxon *here,* an army, *hargian,* to harry. German *Herzog,* a duke, English *harbour;* thence *heru,* a sword, Gothic *haerus.* Root *skal,* to split, Anglo-Saxon *scolu,* a division, and *hal,* to scale, to strike, Anglo-Saxon *healt, halt, hilt* and *hild,* war, Latin *percellere,* to thrust, to strike, *clades,* slaughter, *gladius,* a sword; root *skal,* to be liable for fine for having killed, Anglo-Saxon *seyld,* a debt, *should, shall;* root *ala,* an *awl,* Anglo-Saxon *al;* root *ar,* to cut, to loosen, Latin *aratrum,* a plough, *arvum,* a field plowed but not sown, *earth, ear,* to plow, to till; Polynesian *kari,* to dig; Hawaiian *ali* a scar. Take one or two instances of other letters, root *stut,* to push, Latin *tundere,* to beat with repeated strokes; German *stossen,* to push, to strike; root *slit,* to tear, German *schleissen,* to slit, to split; English *slice,* and Latin *laedere,* to strike or dash with force against any thing; root *slu,* to *shut,* German *schliessen,* English *slot,* and root *luk,* to shut, English *lock;* root *svar,* to speak, to *swear,* to *answer;* and *var,* to speak, Latin *verbum, word.*

We can see then that the Indo-European languages have as greatly changed from the primeval, or archetype language, as English has changed from Anglo-Saxon, or Italian from Latin. It is generally by contact with other peoples, most effectually by change of mothers or household environment that these changes occur, where there is no change in latitude. But it is the vowels that show the least change, for they are the product of the larnyx and internal organs of the throat. The consonants are manipulated by the external parts of the organs of speech which are more affected by changes of temperature and moisture. In assigning a place to a language we must never forget this distinction between the vowels, the products of the protected organs of speech, and the consonants, the products of the unprotected and manipulative organs of speech, the palate, tongue, teeth and lips. In Indo-European and in Polynesian the vowels are naturally therefore the least subject to change, the least unstable. In both it is the consonants that have been most subject to change. But it is the Indo-European that has shown the most change. It has split up each of its explosive consonants, those of the lips, teeth and palate into three, (p, b, f; t, d, th; k, g, gh), and has thus added six sounds to its original range. That this was the case is shown by the discovery of a new Aryan language by Sir Aurel Stein in Chinese Turkestan, some seven or eight years ago. He found a manuscript in the ruins of a Buddhist city written in an unknown tongue that was spoken by a people, the Tochari, included during Roman times in the Bactrian empire. It was found to be a pure Aryan tongue of the European type before the consonants had changed; it had only one dental, one labial and one palatal. If Polynesian is not merely a language that has an Aryan element in it, as Fornander very thoughtfully proved, but is an Aryan language itself, as he declared, then it parted from the primeval European type before the consonantal changes had gone far. It has *t, k,* and in most of its dialects *p,* but Tongan shows the change of *p* to *b* as it shows the change from *t* to *ch* or *tz.* Primeval Aryan as it is seen in Tocharish has the same range of sounds as Polynesian and practically the same sounds and number of sounds. It showed the same tendencies to drop *k,* to make *t* and *k* interchangeable, to elide *r* or make it interchangeable with *l* or *d,* to substitute *s* for *h, f* for *wh,* and *n* for *ng.* Its fundamental vowel was *a;* and so it is in Polynesian. Look in the Hawaiian dictionary and you will find ten times as many words with *a* as the vowel as those with any one of the other four vowels, *e, i, o, u*. From *a* in both languages there are two series of mutations *e* and *i* on the one hand and *o* and *u* on the other. If you look into Fick's Indo-European dictionary, you will find ten times more roots with *a* as the vowel than those that have *e* or *i, o* or *u*. And as far as I can judge by analysis of the roots of more than one syllable or two letters, they are all reducible to roots of one or two sounds, a pure vowel or a consonant and a vowel. In other words primeval Indo-European had the same sound law as Polynesian, i. e. it preferred to close a syllable or word with a vowel.

There is one other point that the discovery of Tocharish settles, it is that the western European type of language came east into Asia. Aryan languages are divided into two sections by a line drawn from the Baltic to the Black Sea. West of that all the languages retain the original *k* sound. East of it all reduce it to a sibilant, at least all till Tocharish was discovered. The former are called by philologists the *centum* languages from the Latin word for one hundred; the latter the *Sato* languages from the Sanskrit word for one hundred. Tocharish retains the *k* unchanged to *s,* and must therefore have come east long before Sanskrit hived off and traveled into Asia. Polynesian also retains the *k* unchanged into *s,* and it too with the same sound-range as Tocharish and the primeval Aryan languages must have traveled from Europe west of the line between the Baltic and the Black Sea through Asia, long before Sanskrit began its long migration into India or even began its elaborate inflectional system. That inflectional system had begun before it completely separated from its cousins; for many of its inflections have close kinship with those of Greek, Latin and the Teutonic languages. Even Polynesian, which shows an extremely primitive beginning of inflections in the personal pronouns (the dual in *ua* and the plural in *ou*), must have hived off and gone east before the inflectionalism had developed to any great extent. There could have been little or no formal grammar, as we can see in Tocharish; the same word could be used as noun, adjective, adverb or verb; and particles supplied the cement or binding element of the sentence.

Of course every dialect of Polynesia has a large percentage of its words and roots peculiar to itself; Hawaiian has, I should think, at least thirty per cent of such, but this is no proof of any alien infiltration, but only of migrations from the sinking fatherland Hawaiki, to the group, separated by so long intervals of time as to allow of the disuse of one set of words in the mother tongue and the loss of another set in the new land. For they have all the same phonology, figurative application and transparency of composition that distinguish all the Polynesian dialects.

The languages of Melanesia and coastal Papua, away to the west of Polynesia, have only a small percentage of their vocabularies in any way to be identified with Polynesian words, and as a rule these are greatly mutilated and often difficult to recognize. I gave some few words in my previous lecture, which going right through to the Malay archipelago yet found their derivation only in Polynesian; as e. g. *bia* or *pia* the sago tree, but in Polynesian "exudation" from *pi* which is used in that language in the sense of " to exude." I will add one more; the Polynesian *wahine,* a woman, comes from *wa* = "set apart" and *hine,* "a girl," but it goes away west into Indonesia in many different forms as e. g. *fafen, vaine, aine, babineh.* I could easily give scores of others. I doubt greatly if the implication in the term "Malayo-Polynesian" that these languages are all akin is correct. For though they are to some extent grammarless like Polynesian, they have much more formal grammar than Polynesian. In the Melanesian and coastal Papuan and to a small extent in the Micronesian and Indonesian languages there is a shorter form of the personal pronoun used as an affix to the noun. These are so much more primitive in their linguistic and intellectual development that they cannot think of a thing but as belonging to some personality; it is always mine or yours or his. The Polynesians have no mental primitiveness of this kind, they can think of a thing in itself and apart from its possession by a person. So in the Polynesian dialects (chiefly in Hawaiian) there is only a trace of a grammatical habit that is found largely in the Indonesian languages and is almost universal in the languages between Polynesia and the Malay archipelago. They cannot use the numerals except with classifying particles; flat things have one special particle to themselves when being counted, and round things another and so on. A third characteristic of those languages to the west is the use of an infix, i. e. the insertion of a significant syllable right into the heart of a word. Polynesian and Aryan show no sign of this. These characteristics reveal a different linguistic attitude of mind from Polynesian and Indo-European.

The linguistic attitude of Polynesia faces north towards Japanese and Ainu which have got no such restriction on their use of nouns and numerals. That the Polynesian vocabulary looks also to some extent in that direction will be apparent from a few examples. (1) Hawaiian *huli*, kalo tops for planting, Samoan *uli*, sprouts of taro, Aino *chi urip*, the Japanese taro-yam, Japanese *uri*, a melon. (2) Maori *takutaku*, to recite incantations, Samoan *ta'u*, to tell. Ainu *itak*, to speak, word, speech. (3) Maori *tango*, to handle, Samoan *tango*, to touch, (Latin *tango*), Malay *tangan*, the hand, Ainu *tek*, the hand. (4) Maori *toko*, to spring up in the mind, Ainu *tok* or *tuk*, to grow, project. (5) Maori *toko*, a pole, (English *stock*), Japanese *oko*, a pole for carrying burdens. (6) Maori *po*, the under world, Ainu *pok*, beneath, under. (7) Maori *tohi*, to cut, Ainu *tui*, to cut. (8) Maori *tuhi*, to tattoo, Japanese *toji*, to prick, to sew. (9) Maori *toma*, a burial place; Ainu *toma*, a mat for rolling the dead in. (10) Maori *Tu*, the god who propped up the heaven, then god of war; Ainu *tuntu*, a pillow, chief support of a building, hence God as the upbuilder of the universe. (11) Maori *tupo*, a tomb, a cave or hiding place for the bones of the dead, *tupapaku*, a dead body; Ainu *tumbu*, a room, house. (12) Maori *tuki*, (Tongan *tsuki*), to thrust or strike with anything endwise; Japanese *tsuki*, to thrust, or strike with anything pointed. (13) Maori *ana*, a cave; Japanese *ana*, a cave. (14) Maori *whau*, (Hawaiian *hau*), the hibiscus from whose bark *kapa* and cords were made: Polynesian *aute*, (Hawaiian *wauke*), the paper mulberry, from Hawaiian *ahu*, to clothe; or the soaked bark of the mulberry, equal to Maori *kahu*, a garment, *kakahu*, to clothe; Japanese *kasu*, the paper mulberry. (15) Polynesian *ahi*, fire; Ainu *abe*, fire; Japanese *hi*, fire. (16) Polynesian *ai*, to beget; Japanese *ai*, love. (17) Tongan *amo*, to use friction on the body; Futuna *amoamo*, to rub a sick person lightly; Ainu *amusa*, to stroke the head as salutation. These have been taken at random out of scores of examples I have marked down in my Maori dictionary.

I must not weary you by too many examples of the affinity of the Polynesian words to European; Fornander has done it to some extent in his third volume, and though a percentage of his examples are inaccurate because he has failed to get at the root of either the Polynesian word or the European and so compared a root element with a merely formative element, seventy-five per cent of his comparisons are on the whole correct and even scientific. I have hundreds of others; a few will suffice. (1) We all know the Hawaiian word *kahuna* for a sorcerer or priest; it is in other Polynesian dialects *tahunga* or *tohunga* or *taunga,* and Paumotan has *tahutahu,* a sorcerer; it is, like so many European words, and still more Polynesian, influenced by two roots; one is *tahu,* to kindle, to make a burnt offering, from the root *hu,* to shine, burn, *tapu,* sacred; the other is *tohu,* to draw out, teach, prophesy, (Ainu *tusu,* to prophesy, Latin *ducere,* to draw out, *educare,* to teach). There is a corresponding word in the European tongue; it is in German *Zauber,* a sorcerer, in Old Norse *taufr,* in Old Saxon *toufere;* this is probably at first from a root *hu* to offer a sacrifice, to perform a sacred service; this appears in Anglo-Saxon *husl,* an offering, the origin of Hamlet's *"unhouselled, unaneled,"* but the prefix *ta* or *to* being added, the other function of a priest, that of educating drew in the influence of the root *tuk,* to guide, teach, which we see in our word *education.* (2) Polynesian *whatu,* a stone, has another form *patu,* to strike, the source of the Maori *patupatu,* a club, a stone striker; this is evidently from *pa,* to strike, and *tu,* to be strong or stiff. In the European languages there is the word represented by English *bat* and *batlet;* the English *battle* and *combat* are from the same, but through French from Low Latin i. e. Latinised Teutonic *batuere,* from batu, to strike, and that is from the same two roots, *ba,* to strike, and *tu,* strong. (3) The Hawaiian *awiki,* to hasten (equal to *wiki*); this is from two roots, *vi,* to be quick, as in *awiwi,* to hasten, and *ki,* to go. The French *vite*＝quick and *vif,* lively or alive. The English *quick* which also means to be alive, is from a root *vi,* to be alive, which appears in Latin *vivere* and *ki* or *kvi,* to hasten, to have energy. (Compare root *i,* to go, Latin *ire.*) This *vi* or *kvi* or *ki,* to be strong, is practically the same as *vi* or *i,* to live; it appears as *i* in Tahitian and Paumotan *vai,* to be, to exist, and in Maori *toi,* life; (compare Latin *aevum*＝English *ever*); this *vai* appears in the Polynesian word for spirit, soul, ghost, *vairua,* which properly means "the double or second existence." In Maori we have the duplication of *wai* in *waiwai* meaning "energy," "intellectual force." The root *i* appears also in the Polynesian *io,* "the soul," and in the Hawaiian *ìo,* reality, truth. (4) The last example I shall take is the word *ruma,* a house, which has been almost driven out of Polynesian by the word *whare,* (Hawaiian *hale,* Samoan *fale*), probably because it was the name or part of the name of some king or chief and had become *tapu;* we find it in Maori *turuma,* an outhouse, in Tahitian *fareturuma,* an out-house, and in Samoan *luma,* a preposition meaning "in front of"; this last shows the original sense of the word "space"; it was the space in front of a temple or a chief's house, (whence a chief's breakfast was called *lumaava,* i. e. the drinking of *ava* before his house); from this it came to be used for "in front of." It goes away west, varying in form in both senses of "space" or "cultivated plot" or "house." In Java *uma* is an unirrigated rice field in the mountains, whilst *ruma* means "a house." In Malekula in the New Hebrides when they make a new garden in the forest it is called *uma;* and right up the Malay peninsula into Assam *"uma"* is the name applied to cutting a space in the forest by felling the trees and burning the bush in order to sow seeds or plant tubers. Now in English we have the word "room" meaning "space," (the older sense), and "apartment," originally "house"; this in Gothic was *rumas,* free space, German *Raum,* Old Norse and Anglo-Saxon *rum;* this meant originally "a space cut in the forest for cultivation" as is seen in the Latin *rus,* "the open country". The first form was *rao,* as is seen in German *"Raum."* The derivation is from the root *ru,* to fell, cut down, seen in such words as Latin *ruina,* downfall, and *diruere,* to pull down, and the affix *ma.* In Polynesian it is also derived from the root *ru,* to strike, to shake, to scatter, and the most common of all substantival affixes—*ma.* Whilst there exists also in Polynesian the word *raorao,* meaning "an open space free from trees," (Samoan) a part of the bush cleared for a plantation, *ruma* does not exist in Sanskrit.

These are specimens taken at random out of many hundreds, if not thousands. With such wealth of affinity in the words and roots, such similarity in the original range of sounds and in the sound-laws between Polynesian and primeval Aryan, it is difficult to resist the conclusion that Polynesian came from Europe many thousands of years ago.

It looks as if this simple, primeval language came in with the first-comers in the old stone age, the potteryless migration that alone brought women into the central and eastern Pacific. For it has remained the most primitive language in the world as far as phonology is concerned. It is the women that mould the sound range, accent and pronunciation of a language. The mothers have the senses of their children completely in their power during the plastic age of the organs of speech, from one to seven; they dominate the phonology as they dominate the household arts like pottery; whilst the men have the vocabulary in their hands, its scope and extensions. It seems almost inevitable then that the main features of the Polynesian tongue, especially the sound-range and the sound-laws, go back to the old stone age in Europe. In that case we must conclude that the Aryan language started on its career from twenty to twenty-five thousand years ago, and that philological students of Latin and Greek and the modern European languages must study Polynesian in order to see the type from which these sprung and the final analysis of their words and roots. This long period of time is necessary to explain the vast extent of the earth over which first Indo-European had spread even before our era, and the still greater extent over which Polynesian elements have spread. Both have more than half circled the world. And if the two are one, we have the most extraordinary language that the world has seen. And out of the divisions of it, English is drawing towards becoming as nearly the universal language as one language can ever be. It is a great thing to have for one's language one of a type that has, as Polynesian has, traveled across half the world by land and then doubled back as far by sea.

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OCCASIONAL PAPERS

OF THE

BERNICE PAUAHI BISHOP MUSEUM OF POLYNESIAN ETHNOLOGY AND NATURAL HISTORY

VOLUME VII—NO. 3.
WITH PLATES III–XI

NEW HAWAIIAN PLANTS—VII

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CHARLES N. FORBES

HONOLULU, HAWAII
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New Hawaiian Plants—VII[1]

By Charles N. Forbes.

In classifying and incorporating the Hawaiian botanical material at the Bernice P. Bishop Museum Herbarium, the plants on which the present paper is based seemed to be sufficiently distinct to be described as new species. With the exception of the Hibiscadelphus, which was collected many years ago by Dr. Wm. Hillebrand and sent by him to Horace Mann, all of these species have been collected by the author since 1908.

Hibiscadelphus bombycinus, sp. nov.

PLATE III.

Tree or shrub? Leaves reniform or somewhat orbicular in outline, obscurely five lobed with the lobes repand above, deeply cordate with the lobes overlapping at the base, rounded at the apex, stellate pubescent on both faces, especially below, 7-8.7 cm. long, 6.5-8.2 cm. wide; petioles pubescent, 4.2-5.2 cm. long. Flowers single, on pedicels of 2.1-3 cm. in length. Involucral brats strap-shaped, rounded at the apex, 9 mm. long, 2-3 mm. wide, stellate pubescent. Calyx cup-shaped, 6-toothed, or lobed, stellate pubescent on the outside, 1.2 cm. high. Corolla slightly curved, hardly opening, densely stellate pubescent, the nerves prominent, 3.4 cm. long. Staminal column scarcely exserted. Capsules woody, either globular and 2.9 cm. high, or obovoid and 3.2 cm. high, dense stellate hirsute on the outside. Seed covered with yellowish hair.

Type in the B. P. B. M. Herbarium, collected at Kawaihae-uka, (inland) Hawaii, T. H., by Wm. Hillebrand, not numbered; formerly in the Mann and Brigham Herbarium.

This species is closely related to *H. hualalaiensis* Rock, but differs in the strap-shaped involucral bracts, and smaller leaves.

The type sheet bears a label in Hillebrand's handwriting, referring the specimen to "Hibiscus section Bombycina," and also two envelopes containing capsules. Most of these capsules resemble those of *H. hualalaiensis* Rock, but one in better condition than the others is similar to those of *H. Giffardianus* Rock. Hillebrand described no Hibiscus with the characters of Hibiscadelphus, though Rev. J. M. Lydate informed me, that he remembered collecting this species at Kawaihae, and calling Hillebrand's attention to its peculiarities. It is difficult to understand why Hillebrand should send specimens to Mann without retaining duplicates, but Mr. J. F. Rock informs me that he saw no specimens of Hibiscadelphus in the Hillebrand collection at Berlin. As the native vegetation at Kawaihae has practically disappeared, the species is probably extinct.

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[1] Continued from Occ. Papers, B. P. B. M. Vol. IV, 3, 4; V. 1; VI, 1, 3, 4.

Viola kauaiensis Gray, far. **wahiawaensis,** var. nov.

PLATE IV.

This well marked variety differs from the species in its leaves which are cuneate at the base, never truncate or reniform. As in the species the petioles vary greatly in length, and the fragrant flowers vary in size. All the plants observed at the Wahiawa bog belong to the variety, those at the type locality, mountains above Waimea, Alakai swamp, and Lehua makanoe, to the species.

Type in the B. P. B. M. Herbarium, collected at the Wahiawa swamp, Kauai, T. H., August, 1909, by C. N. Forbes, No. 166, K. There are two unnumbered specimens in the B. P. B. M. Herbarium, collected at the Wahiawa swamp by Rev. J. M. Lydgate.

Cyrtandra olona, sp. nov.

PLATE V.

Stem 6 dm. high, unbranched, glabrous in all parts. Leaves opposite, broadly ovate in outline, obtusely rounded at the apex, truncate at the base, a few slightly uneven-sided, crenate except at the base, glabrous, very dark green above, paler below, nerves prominent, 15.4-16 cm. long, 12-12.5 cm. wide, petioles 6-11.5 cm. long. Flowers (several?) on a common peduncle of 7 mm.; the pedicels of the same length, bracts not seen. Calyx cup-shaped, shortly 5-cleft with deltoid, acute lobes, glabrous, 8 mm. high. Corolla small, white, slightly curved, 1.1 cm. high. Ovary glabrous. Fruit not seen.

Type in the B. P. B. M. Herbarium, collected at the Wahiawa mountains, Kauai, T. H., August, 1909, by C. N. Forbes, No. 213, K.

The mature, bluish-green, and the coarsely veined juvenile leaves are rather suggestive of the Olona, *Touchardia latifolia.* The species is distinct from any Cyrtandra known to me, but may prove to be distantly related to *C. cyaneoides* Rock. Only a single specimen of each of these Cyrtandras is recorded.

Cyrtandra hii, sp. nov.

PLATE VI.

Villose shrub, the pubescence on the younger branchlets and petioles dark purplish. Leaves elliptic-lanceolate, or oblanceolate in outline, acuminate at the apex, acutely tapering toward the base, finely serrate, at least in the upper portion, villose on both faces, nerves prominent on the lower side, 15.8-16 cm. long, 3.8-4.3 cm. wide, petioles 2.9-3 cm. long. Inflorescence an open cyme, dark shaggy villose, the pedicels 2 cm. long, the bracts oval, 5 mm. long. Calyx cup-shaped, broadly and shallowly lobed, the lobes acute, rusty villose on both faces. Corolla white, small, curved slightly projecting beyond the calyx, the lower petals the largest, white villous on the outside, the lower part of the tube glabrous, glabrous within, the tube 7 mm. high. Fruit ovoid, white.

Type in the B. P. B. M. Herbarium, collected at the Hii mountains, Kauai, T. H., October 22, 1916, by C. N. Forbes, No. 166, K. (fruit lacking). In the B. P. B. M. Herbarium from the same locality are No. 654, K, collected by C. N. Forbes and an unnumbered, undated sheet of specimens collected by Rev. J. M. Lydgate; collected at the Waioli Valley, Kauai, T. H., August 5, 1909, by C. N. Forbes, No. 132, K.

This species has the calyx of the Crotonocalyx group, but the leaves of the Schizocalyx group. The calyx shows no tendency to split. The leaves of No. 132, K, 21.3 cm. long, 7.3 cm. wide and the petiole, 5.9 cm. in length, are larger than the type; other features the same. This species differs from *C. Knudsenii* Rock in the calyx, which is broadly lobed instead of narrow-lanceolate, and in the pubescence of the corolla which is villous, not hirsute. The calyx lobes are not parted below the middle. It shows relationship to *C. kauaiensis* Wawra in the thinner calyx, and pubescent ovary.

Cyrtandra propinqua, sp. nov.

PLATE VII.

Shrub with pale rust-colored, spreading, hirsute hairs. Leaves cordate, opposite, abruptly acuminate at the apex, serrate (more coarsely serrate than in *C. waiolanii* Wawra), papillose-hirsute above, pubescent below with the veins hirsute, 10.6-12.2 cm. long, 8.3-10.6 cm. wide, with hirsute petioles 4.5-5 cm. long. Inflorescence hirsute, flowers three, on a common peduncle of 2.5-3.1 cm. long, the pedicels 1.8-2.3 cm. long; the bracts ovate, 1.4 cm. long, 8 mm. wide. Calyx hirsute with spreading hairs, 1.7 cm. high, split at the base into five lanceolate sepals, which become recurved at the apex. Corolla as in *C. waiolani*, the pubescence silvery white and slightly longer. Berry not seen.

Type in the B. P. B. M. Herbarium, collected at the Koolauloa mountains between Punaluu and Kaipapau, Oahu, T. H., Nov. 14-21, 1909, by C. N. Forbes, No. 2563, O.

This species differs from *C. waiolanii* Wawra in its cordate leaves, differently shaped bracts, and somewhat in the pubescence of the corolla. *C. propinqua* has calyx lobes broader at the base than those of *C. waiolanii,* which are linear. The two species are closely related.

Cyrtandra Munroi, sp. nov.

PLATE VIII.

A shrub with rust-colored tomentose branches. Leaves opposite, elliptical in outline, acuminate at the apex, acute at the base, serrate, hirsute on both faces, especially along the rust-colored nerves and petiole, dark green above, paler below, 14.2-15 cm. long, 6.8-9.4 cm. wide; petiole 5.3-5.7 cm. long. Inflorescence rusty tomentose, the common peduncle 2.2-4.5 cm. long, the pedicels 1.4-3.1 cm. long, the bracts ovate, acute, 1 cm. long, 7 mm. wide, 1-3 flowered. Calyx cup-shaped, incised to the middle, lobes broad, acute, hirsute, 9 mm. high. Corolla erect, hirsute on the outside, glabrous within, projecting beyond the calyx; the tube 1.4 cm. long, the small lobes sub-equal. Ovary glabrous. Berry conical, rusty holosericeous, 2.3 cm. long, 1.1 cm. in diameter.

Type in the B. P. B. M. Herbarium, collected at the eastern end of the mountains of Lanai, T. H., June, 1913, by C. N. Forbes, No. 239, L. Also collected at the Pali above Waiopaa, Lanai, T. H., March 25, 1915, by G. C. Munro (No. 417).

C. Munroi belongs to the section Crotonocalyces of Hillebrand, resembling certain forms of *C. platyphylla,* from Hawaii, in the shape of its leaves, but is more closely allied to the species belonging to this section which occur on the island of Maui. The leaves of the specimen collected by Munro are unequal sided.

Cyrtandra Georgiana, sp. nov.

PLATE IX.

Shrub. Branches covered with a short hirsute pubescence. Leaves opposite, elliptical to obovate in outline, acuminate at the apex, cunate at the base, hirsute above, rusty tomentose below, especially along the veins, serrate, 16-16.4 cm. long, 7.4-9.8 cm. wide, with pubescent petioles 2.7-4.5 cm. long. Inflorescence rusty tomentose, 3-6 flowered, some pedicels bearing 2-3 flowers, of which the primary and secondary pedicels combined equal in length the primary single flowered pedicel, the common peduncle 3.9-4.3 cm. long, the pedicels 2-2.8 cm. long, the bracts ovate, acute, 1 cm. long, 6 mm. wide.

Calyx deeply parted to near the base, the sepals ovate-acuminate, narrowed at the base, rusty pubescent on both faces, 1 cm. long, 5 mm. wide. Corolla (incomplete) sparingly pubescent on the outside, glabrous within. Ovary glabrous. Berry ovoid, glabrous, 1.2 cm. long, 8 mm. in diameter.

Type in the B. P. B. M. Herbarium, collected in the mountains of Lanai, T. H., September, 1917, by C. N. Forbes, No. 348, L.

Although this species belongs to the Schizocalyces of Hillebrand, it is more closely related to *C. Munroi* Forbes of the Crotonocalyces than to any other described species.

Clermontia Samuelii sp. nov.

PLATE X.

While collecting botanical specimens on the northern slope of Haleakala, Maui, T. H., between the Keanae Gap and Kipahulu, at an elevation of about 6500 feet, the writer observed a very beautiful species of an undescribed Clermontia, in the dense rain forest a short distance west of an old cone called Wai Anapanapa. In color and shape the flowers resemble those of the common form of C. grandiflora Gaud, which is common on the western slopes of Haleakala in the vicinity of Ukulele, but in other characters the plant differs widely from any of the described species. While related to C. grandiflora Gaud. in character of flowers and in size of leaves, it is at once separated by the character of its inflorescence, and the pubescence of the leaves. This species is very distinct from C. kakeana Meyen and related species, having pubescent leaves; while the flowers at once separate it from C. parviflora Gaud. and its allies. It was the only Clermontia seen in the type locality, but the forest is very dense there, and practically unexplored. I take pleasure in naming the species in honor of Mr. S. A. Baldwin of Makawao, Maui, who very generously aided the Museum in the exploration of Haleakala, and to whom the writer is indebted for many kindnesses.

Clermontia Samuelii has the following characters:

Shrub, 12-18 dm. high, densely branched from the base, the branchlets covered with dense brownish pubescence which is purple on new growth. Leaves obovate to elliptical in outline, acute or sub-acuminate at the apex, acute or cuneate at the base, finely serrate with callous pointed teeth, with fine soft whitish tomentum on both faces but most so below, very dark green above but not shiny, dark but much paler below, rather thin chartaceous when dry, 6.4-7.4 cm. long, 2.3-3.2 cm. wide, on pubescent petioles of 1.4-1.6

cm. in length. Inflorescence a 2-5 flowered cyme, the peduncle 13-8 mm. long, marked by scars and one or more pairs of linear bracts 3 mm. in length; the pedicels filiform, drooping, 2-1.6 cm. long, with subulate bracts near the base. Flowers slightly curved or sickle-shaped. Calyx glabrous, thin, slightly shorter than the corolla, the lobes linear acuminate, the upper one splitting to near the base, the lower ones splitting one-third the distance of the tube, a delicate purplish-pink color; the ovarian portion turbinate, bright green, 1.1 cm. long. Corolla 4.6 cm. long, 6 mm. wide, glabrous, slightly lighter colored than the calyx. Staminal column and anthers glabrous, purple. Mature fruit not seen.

The type is mounted on sheet No. 1225, M, in the B. P. B. M. Herbarium at Honolulu, and was collected by C. N. Forbes on the north slope of Haleakala, Maui, T. H., at an elevation of 6500 feet to the west of Waianapanapa, August 22, 1919. Another specimen is mounted on sheet No. 1215, M, and was collected near the same station on the same date.

Argyroxiphium caligini sp. nov.

PLATE XI.

During the month of May, 1910, while botanizing on Puu Kukui the summit of West Maui, a small colony of a species of Argyroxiphium was observed, but unfortunately all the plants were sterile. While the plant has since been observed by Mr. J. F. Rock and others, no one seems to have collected flowering specimens.[2] In September of 1917 while collecting on Eke an isolated cone which is about 1000 feet lower in elevation than Puu Kukui, this species of Silversword was found to be one of the most conspicuous plants of this boggy habitat. The plant proves to be a different species from that found on either the uplands of the island of Hawaii or of East Maui. It differs from the other described species in its much smaller size. The silvery leaves are about the width of those of A. virescens Hbd., but only half the length. The flower heads are smaller than those of A. virescens, which are described by Hillebrand as smaller than those of A. sandwicense, DC. Field experience has proved that size of head is a variable character, the flower heads of many plants being fully as large as those of A. macrocephalum Gray. Another form of Argyroxiphium on Eke differed in having somewhat greenish leaves which however were much more pubescent than those of A. virescens Hbd. and also differed in the glandular pubescent, not silvery raceme. The Puu Kukui plants probably belong to this form. This plant was not observed in any of the extensive bogs on Haleakala, and is probably not a cross between A. macrocephalum and A. virescens or Wilkesia Grayana. Argyroxiphium plants growing in the bogs on Haleakala are not depauperate.

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[2] J. F. Rock in Annual Rept. Bd. Agr. and For., T. H., for 1910, p. 80 (1911); also for 1918, p. 53 (1919).

A detailed description of Argyroxiphium caligini follows:

Herb with a stem of 2-2.5 cm. in diameter, soon tapering into a simple foliose raceme of 3-4 dm. in length. Leaves linear, 10.5-12.2 cm. long, 4-5 mm. wide, densely silvery-sericeous. Raceme simple; the rachis, leaves, and foliar bracts silvery-sericeous; the pedicels slender, green, viscous-pubescent, 5-9 cm. long. Heads nodding, 1.5-1.7 cm. in diameter. Invocural bracts viscous-pubescent, green, lanceolate, acuminate. Ray flowers few, ligulate, the ligules bifid, 3-4 mm. in length, 1 mm. or less in width, purplish colored as are the disk flowers. Disk flowers with the limb 4 mm. in length, narrow below and puberulous, widening above and glabrous. Achenes glabrous, 5-7 mm. long, the radial ones shorter and curved. Pappus of ray flowers reduced to a narrow truncate coronula. Pappus of disk flowers reduced to 5 or 6 corneous, acute, teeth-like paleae which are deciduous from a disk.

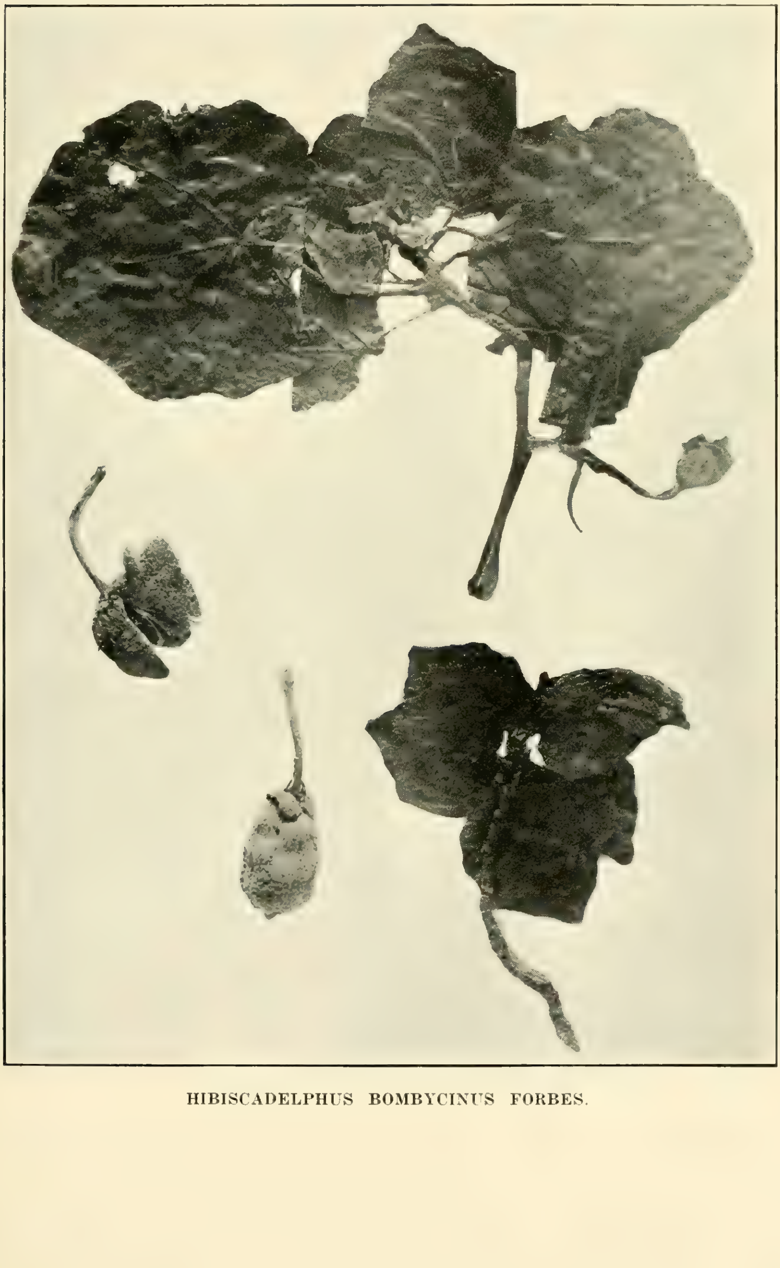
Type in the B. P. B. M. Herbarium, No. 391, M, collected on Eke, West Maui, T. H., October, 1917, by C. N. Forbes.

Argyroxiphium caligini var Kai var. nov.

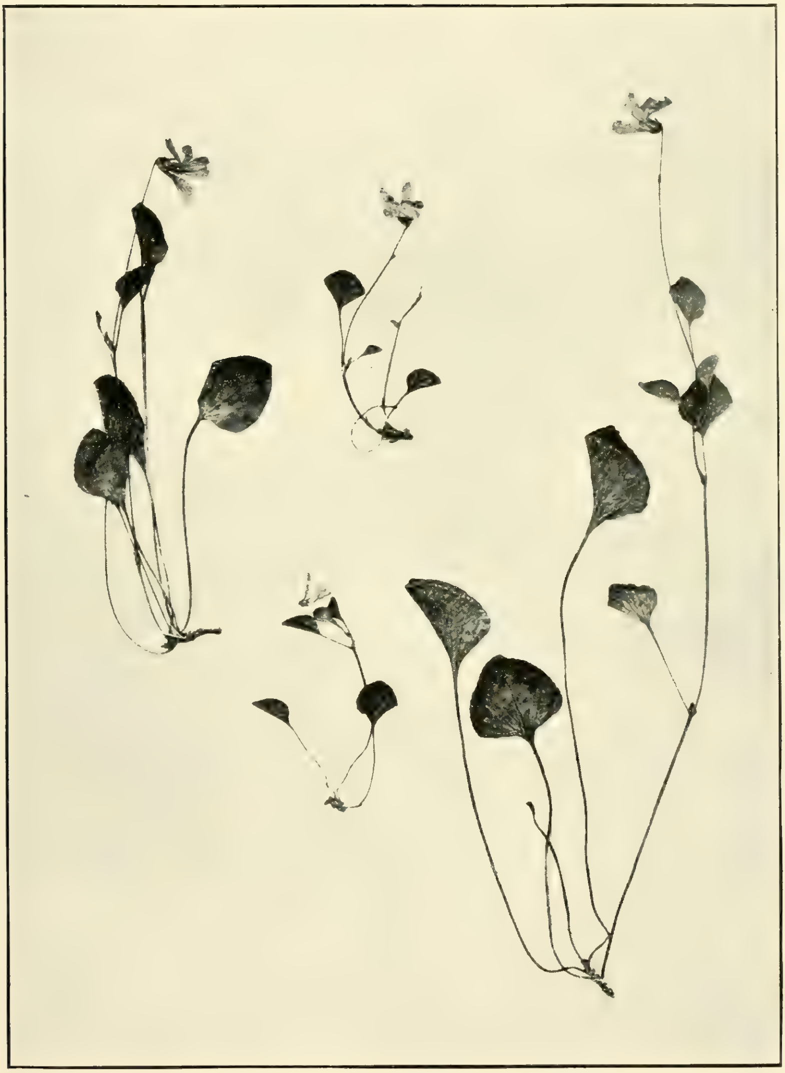
Leaves with a slight greenish hue to the pubescence. Rachis of the raceme glandular pubescent and not silvery.

While of wider distribution than the species, it is much less common. The variety is named for Mr. K. Kai, head ditch man at Honokohau Valley, Maui, who aided in the exploration of Eke.

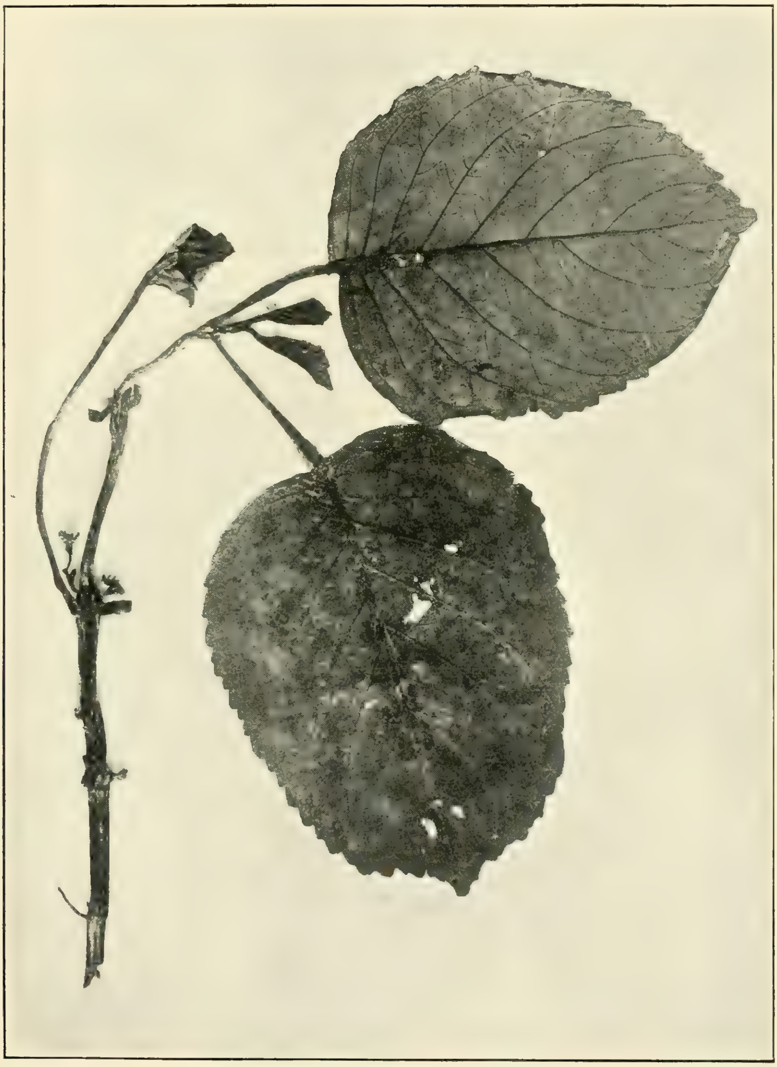
Type in the B. P. B. M. Herbarium, No. 391, a. M., collected on Eke, West Maui, T. H., October, 1917, by C. N. Forbes. Another specimen in the same Herbarium is No. 64, M, collected on Puu kukui, West Maui, T. H., May, 1910, by C. N. Forbes.



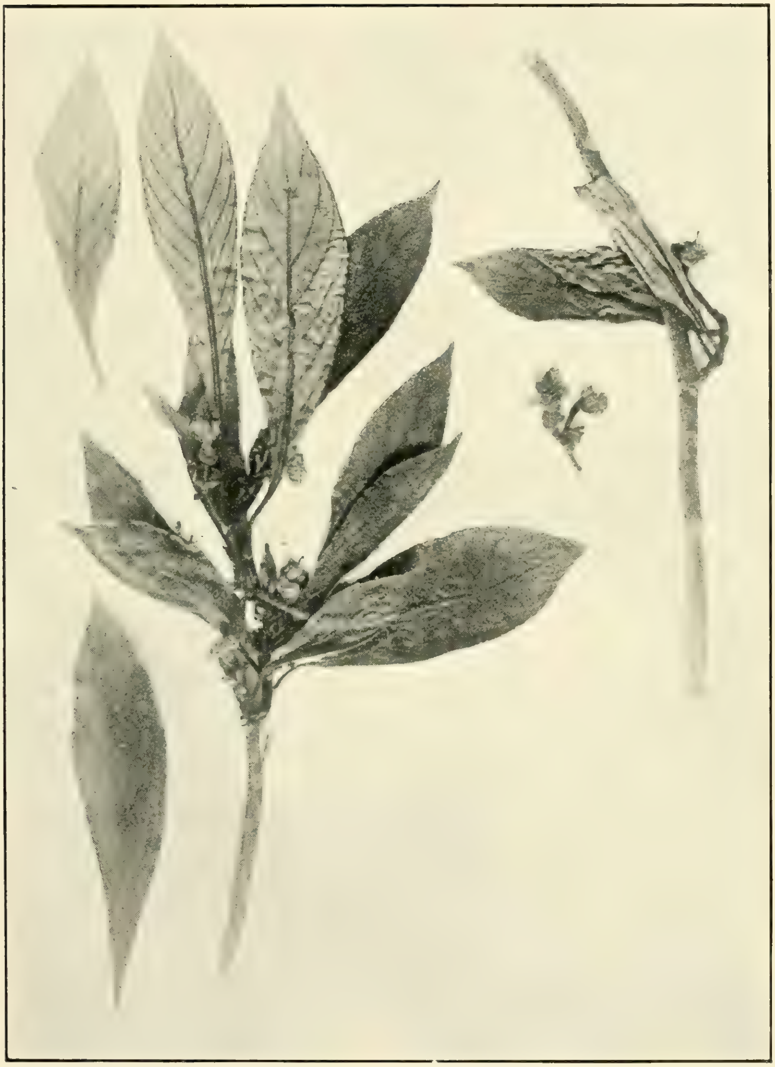
HIBISCADELPHUS BOMBYCINUS FORBES.



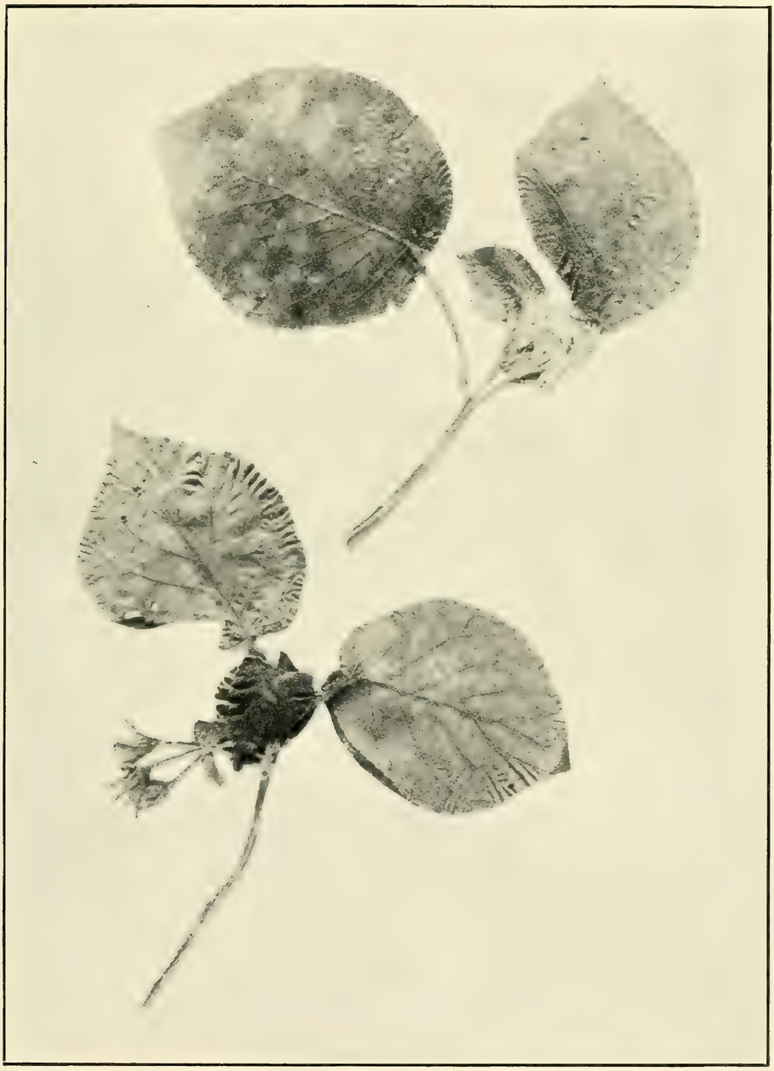
VIOLA KAUAIENSIS WAHIAWAENSIS FORBES.



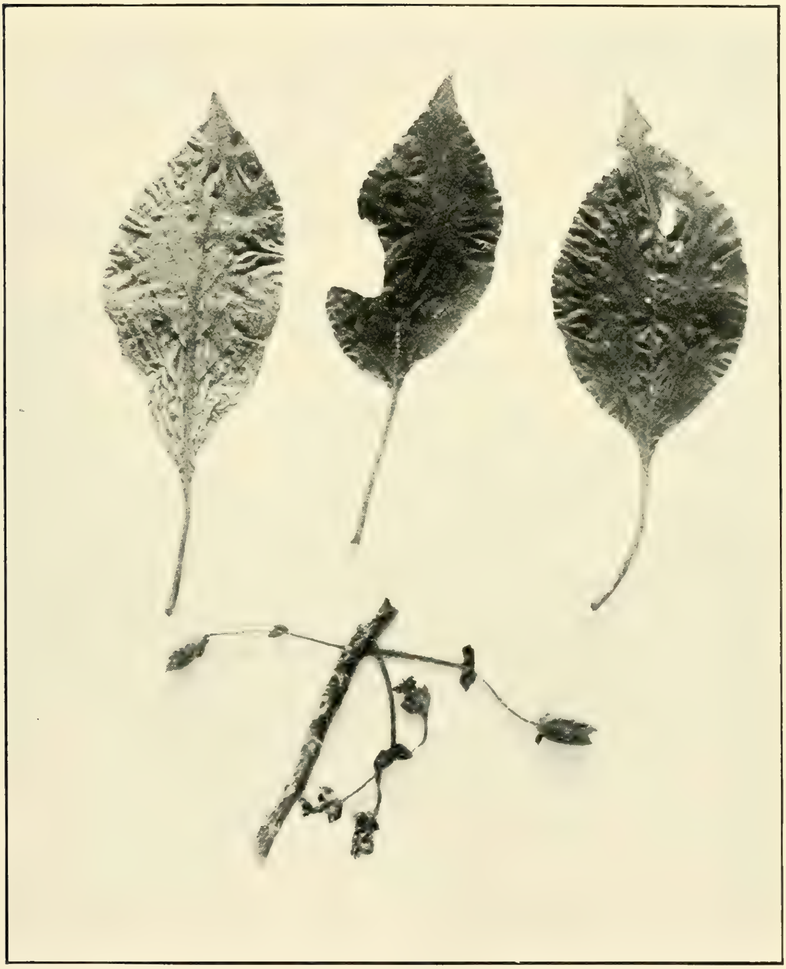
CYRTANDRA OLONA FORBES.



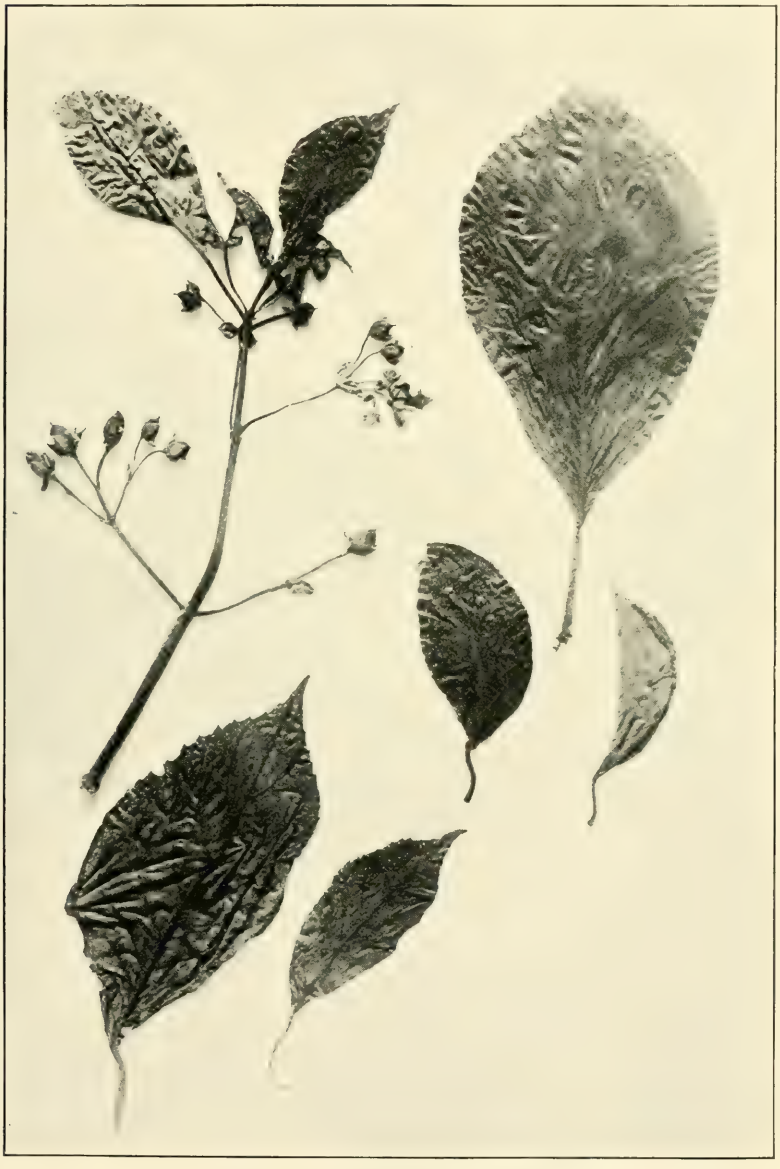
CYRTANDRA HII FORBES.



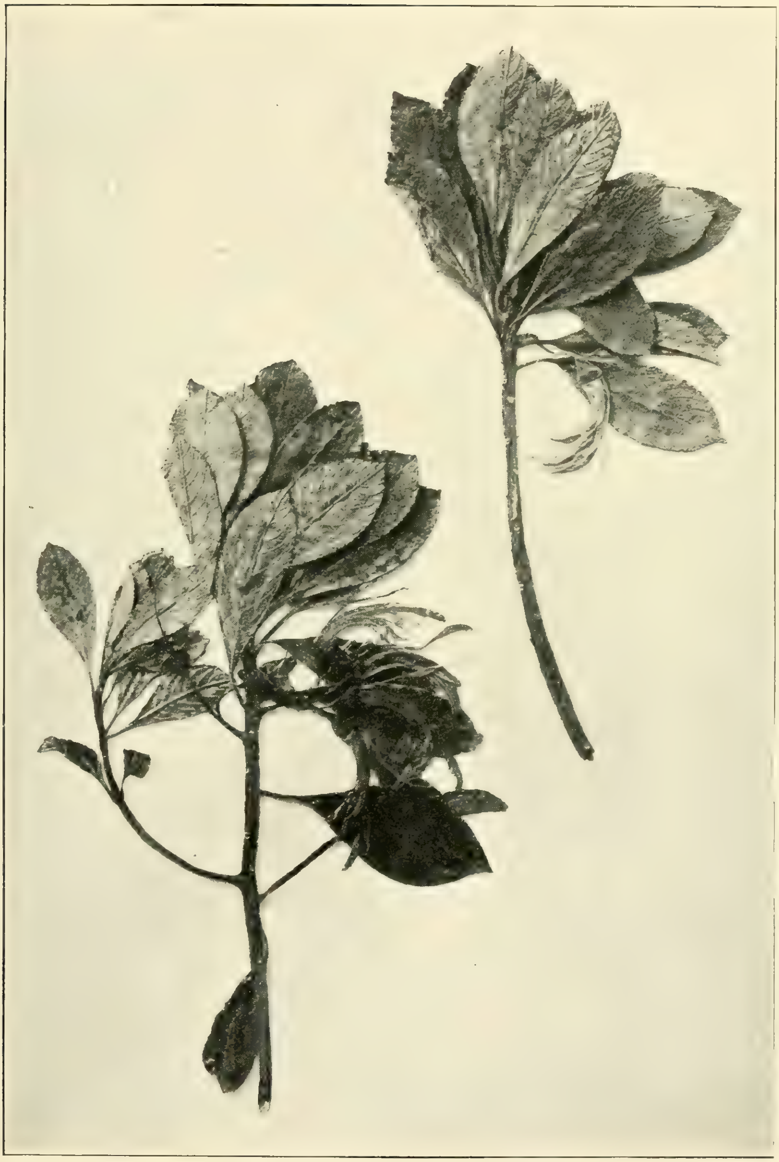
CYRTANDRA PROPINQUA FORBES.



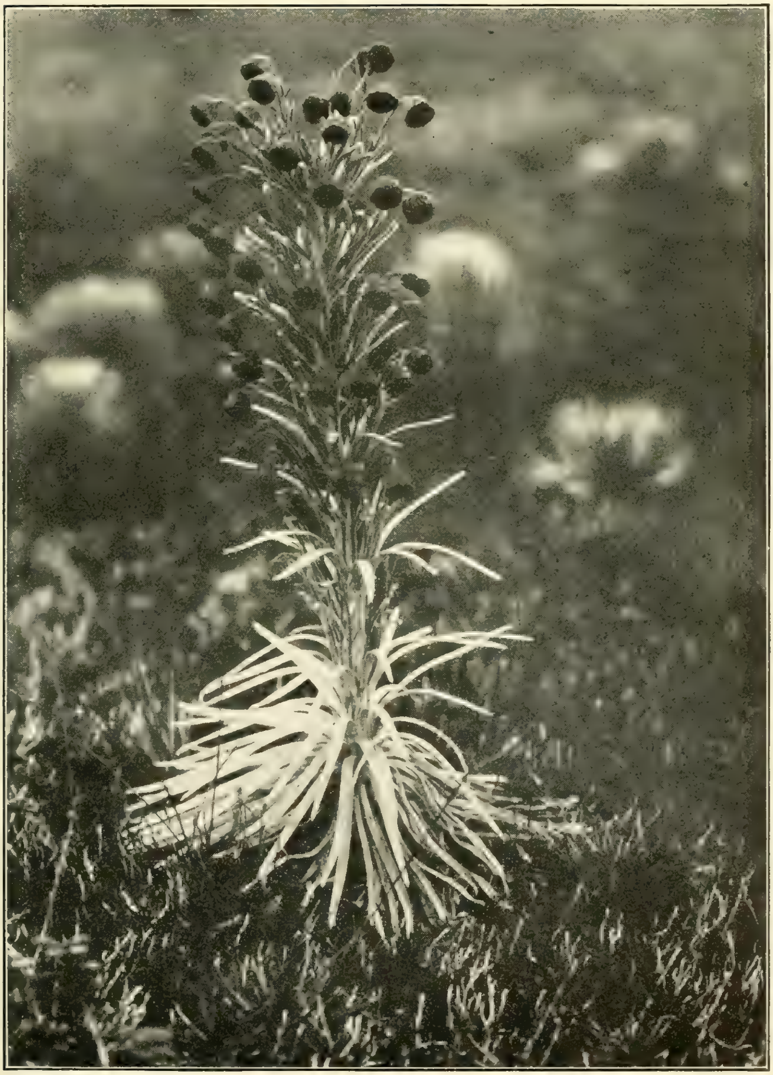
CYRTANDRA MUNROI FORBES.



CYRTANDRA GEORGIANA FORBES.



CLERMONTIA SAMUELII FORBES.



ARGYROXIPHIUM CALIGINI FORBES.

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OCCASIONAL PAPERS

OF THE

BERNICE PAUAHI BISHOP MUSEUM OF POLYNESIAN ETHNOLOGY AND NATURAL HISTORY

Volume VII—No. 4

With Plate XII.

A NEW CYANEA FROM LANAI, HAWAII

By

Charles N. Forbes and George C. Munro.

HONOLULU, HAWAII
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A New Cyanea from Lanai, Hawaii

By Charles N. Forbes and George C. Munro.

The following interesting species of Cyanea was found by Mr. G. C. Munro and Mr. Frank Baldwin at Keomuku, Lanai, T. H.

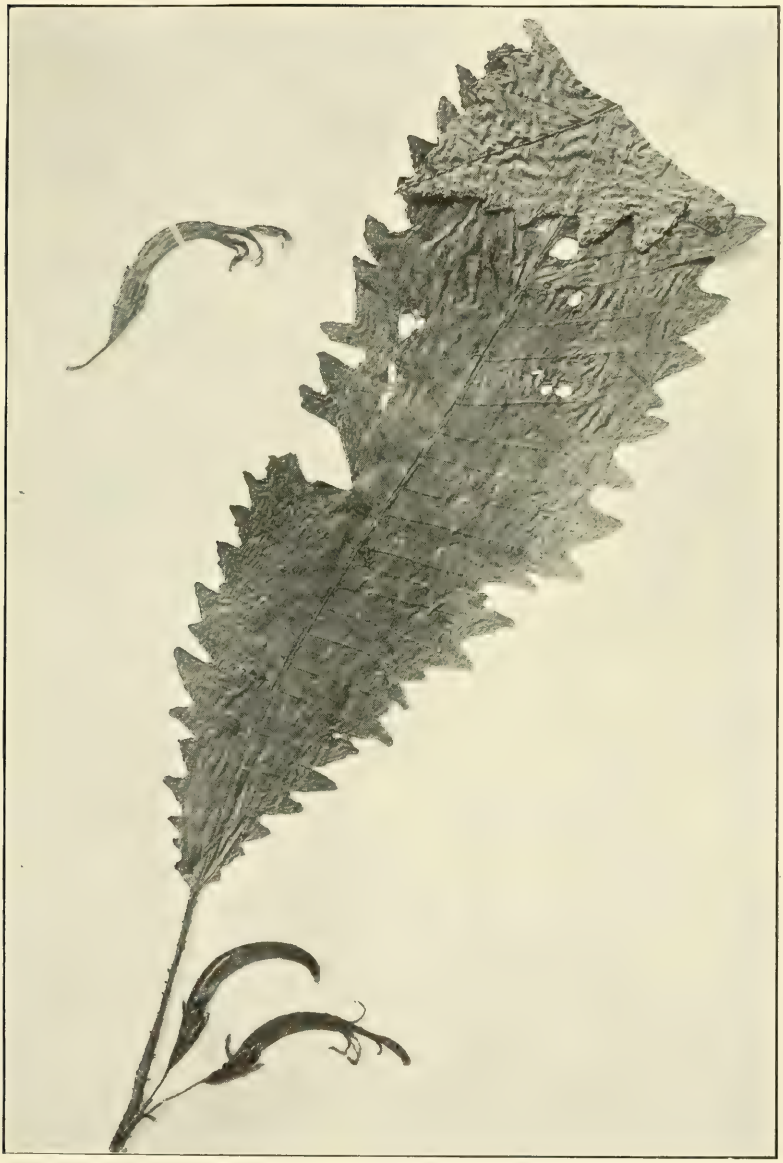
Cyanea Baldwinii sp. nov.

PLATE XII.

A shrub 15 dm. high, branching from the base; leaves elliptic-oblong, acute at the apex, obtuse at the base, irregularly, strongly, and acutely sinuate, glabrous and dark green above, scabrous or echinulate and green below, membraneous, 30.4-39.9 cm. long, 11.4-12.3 cm. wide, with echinate petioles 7.9-9.2 cm. long; peduncle dark purple, 14 mm. long, sparingly echinate, few flowered, the bracts narrow-linear 9 mm. long, the pedicels slender, 2.4 cm. long; calyx purple at the base, sparingly pilose, the tube conical, 12 mm. long, the lobes oblong, abruptly acute, with a strong mid-vein and faint lateral ones, 10 mm. long, 3-4 mm. wide; corolla curved, purple, pilose, 5.9 cm. long, the lobes linear, 1.6 cm. long; staminal column glabrous, the anthers bearded, 11 mm. long. Fruit not seen.

Type in the B. P. B. M. Herbarium, No. 674, collected at Lanaihale, Lanai, Hawaii, September, 1919, at an elevation of about 3000 feet, by G. C. Munro. Only a single bush of this rare species was seen by the collector.

This plant is distinguished from either Cyanea Gibsonii Hbd. or from Cyanea atra Hbd. by its corolla which is sparingly pilose, not hirsute, by its lighter color, shorter corolla lobes, and by the pubescence of its leaves. In texture the leaves are similar to those of Cyanea Gibsonii Hbd. The anthers are shorter than those of Cyanea Gibsonii Hbd. which measure 16 mm. in length, but are of the same length as those of Cyanea atra Hbd. Cyanea Baldwinii Forbes and Munro seems rather remotely removed from either Cyanea Gibsonii Hbd. or Cyanea atra Hbd. but cannot be well compared with any other species. Our illustration, plate I, is of the type specimen.



CYANEA BALDWINII FORBES AND MUNRO.

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NOTES ON MARSILEA VILLOSA KAULF

By

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Notes on Marsilea Villosa Kaulf

Charles N. Forbes.

Marsilea villosa, first collected by Chamisso on the island of Oahu, Hawaii, was described by Kaulfuss[1] as follows:

> M. foliolis cuneato-obovatis rotundatis integerrimis strigosis, petiolis strictis coarctatis, capsulis subsessilibus villosissimis. Habitat in Owahu [Oahu]. Chamisso. Foliola subtus strigosa. Petioli 4-6 pollicares subcapillares strigosi. Capsulae lana ferruginea involutae.

Brackenridge[2] referred specimens of Marsilea collected in Oregon, California, and Oahu, Hawaii, to *M. villosa* Kaulf. He considered *M. vestita* Hk. and Grev. to be a synonym, stating in the text:

> The plants from these several localities do not differ from each other in any essential respect. The leaves and peduncles in specimens from the same locality sometimes vary in being more or less villous. Our Oregon plant is evidently the *M. vestita* of Hooker and Greville[3], although not quite so hairy

W. J. Robinson[4] makes the following statement in regard to *M. villosa:*

> The specimens examined indicate that the Hawaiian plant is a larger and less hairy species than that figured by Hooker and Greville.

Through the kindness of Dr. W. A. Setchell I have recently had the opportunity to examine the *M. vestita,* chiefly fruiting specimens, in the University of California Herbarium. Although there was considerable variation in this representative series of specimens, from numerous localities in the region extending from Oregon to Lower California, nearly all of the plants were less hairy than old fruiting specimens of *M. villosa* recently collected in Hawaii. The *M. vestita* of the west coast of North America grows in places that become completely dry in summer. Having had a large colony of *M. villosa* under observation since 1916, I can now positively state that the pubescence of this species, and probably also of *M. vestita*, is a character which is dependent on environmental factors.

---

[1] Kaulfuss, G. F., Enumeratio filicum quas in itinere circa terram legit Cl. Adalbertus de Chamisso, p. 272, 1824.

[2] Brackenridge, Wm. D., U. S. Exp. Wilkes, Botany, Filices, p. 340, 1854.

[3] Hooker, W. J., and Greville, R. K., Icones filicum, vol. 2, tab. 159, 1831.
in all its parts as represented by their figure.

[4] Robinson, W. J., A taxonomic study of the Pteridophyta of the Hawaiian Islands: Bull. Torr. Bot. Club, vol. 39, p. 233, 1912.

Marsilea villosa is now very rare in Hawaii, and is not represented in many herbaria. The habitats for the plant are old taro patches, places where *Colocasia antiquorum* was cultivated. According to Robinson[5] all specimens of it in the Berlin Herbarium are sterile, and those collected by Remy have narrower leaflets and a more compact rootstalk than those collected by Chamisso.

A station for this plant was found in Palolo valley, within the city limits of Honolulu, in a small, poorly drained area formerly taro patches, but now overgrown with several species of grass and sedge, among which are a few large Kiawe trees (*Prosopis juliflora*). Among the sedges was an abundance of *Elaeocharis palustris* (L) R. Brown, which was recorded from Oahu by Kunth, though its existence in the Hawaiian group was doubted by Hillebrand.[6]

When the station was first visited in March, an area of about two acres was flooded with water, on the surface of which were floating thousands of Marsilea leaves. The plants gathered at that time were all sterile and were glabrous in all parts except the nodes, which varied from nearly glabrous to somewhat woolly (Pl. XIII). The length of the petioles varied directly with the depth of the water in which the plants were growing—long petioles in deep water, short petioles in shallow water—and were of unusual length on plants growing in water amongst grass. Plants taken from shallow water near the edge of the pond had petioles ranging in length from 3.5 to 4.0 centimeters; whereas many growing in water with grass had petioles of 23 centimeters in length. In proportion as the water dried up with the advance of summer, the plants became more and more conspicuously rusty woolly at the nodes, and the under side of the leaves became pubescent with whitish hairs. Finally when the water had disappeared, during the last week in April of the same year, the plants were found to be densely rusty woolly at the nodes, with occasionally a few scattered hairs along the rhizome. On a dry hummock a single fruiting specimen was found.

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[5] Robinson, W. J., op. cit.

[6] Hillebrand, Wm., Flora of the Hawaiian Islands, p. 474. 1888.

The locality was not revisited until May of 1917, at which time the water had not entirely dried up. Many fruiting specimens were collected where the water had disappeared, particularly along the edge of a road, where the rhizomes were covered with a loose volcanic ash. The sporocarps were covered with rust-colored silky hairs, and in many specimens were hidden in the dense rust-colored wool of the rhizome. It is notable that practically all fruiting plants were found either at the edge of the water—not in it—or in places that had become dry early in the season (see P. XIV). Plants growing in deeper water generally wither up and die before producing sporocarps. The locality was visited several times during the latter part of 1918, and finally July 1, 1919, when a portion of the area was found to be full of rubbish and dry. Only a few fruiting plants and no living sterile plants were seen.

Under culture in an aquarium, glabrous plants of *Marsilea villosa* behaved exactly as in nature, in respect to the development of pubescence, while the water was evaporating. All specimens experimented upon produced a vigorous vegetative growth, but died before producing sporocarps.

Following Brackenridge[7] it is my opinion that *M. villosa* Kaulf. and *M. vestita* Hk. and Grev. are the same species. Differences in regard to the pubescence, length of petiole, and compactness of rootstalk of different herbarium specimens of these species are merely the result of environmental conditions at the time the specimens were collected. Differences in size and width of the leaves of different specimens are merely individual variations.

It is probable that *M. villosa* was brought from the West Coast of North America to Hawaii by natural means.

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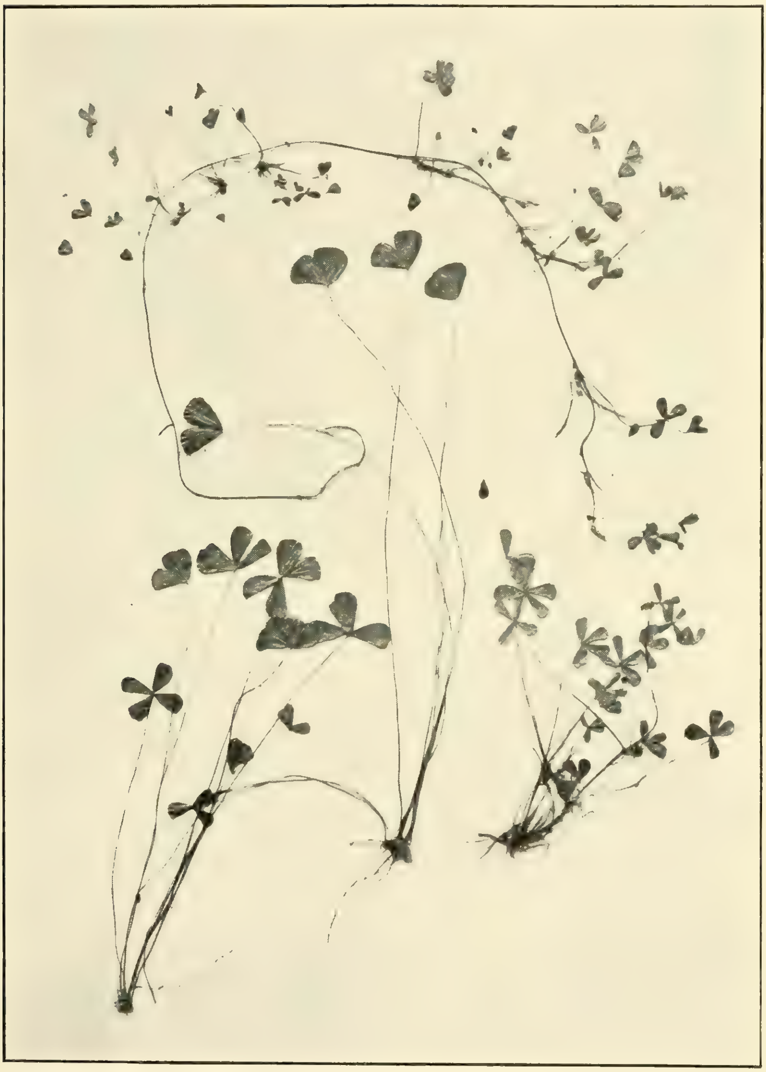
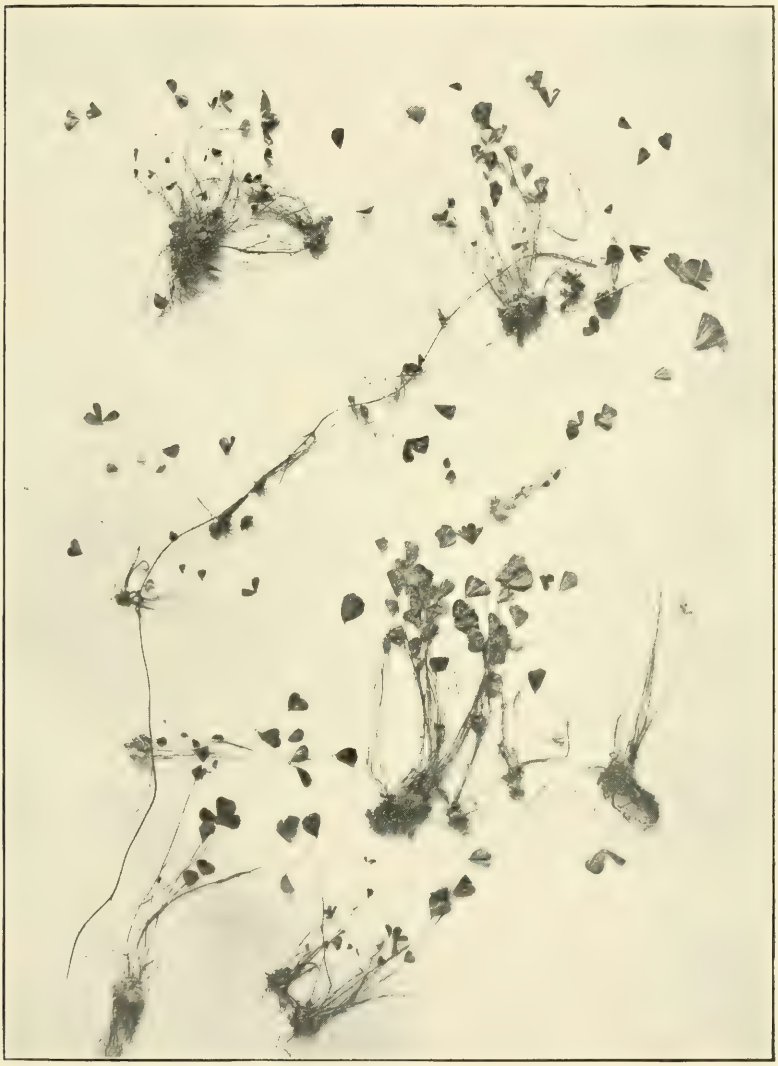
[7] Brackenridge, Wm. D., op. cit.



MARSILEA VILLOSA KAULF. Sterile specimens showing variation in length of petioles in proportion to the depth of the water in which they grew—the longest petioles from the deepest water. The central specimen grew with grass in water. No. 2362 B. P. B. M. Herbarium.



MARSILEA VILLOSA KAULF. Fruiting specimens showing the compact rootstalks of the fruiting plants as compared with sterile plants. It will be noted that the fruiting specimens are villous in all parts, especially at the nodes which are densely rusty woolly. No. 2515. O B. P. B. M. Herbarium.

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OCCASIONAL PAPERS

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VOLUME VII—No. 6.

WITH PLATE XV.

A NEW VARIETY OF PARTULINA HORNERI

By

J. J. and A. GOUVEIA.

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A New Variety of Partulina Horneri

By A. Gouveia

Partulina horneri, (Baldwin) var. **kapuana,** n. var.

J. J. and A. GOUVEIA.

PLATE XV.

Shell sinistral, translucent, apex acute, spire slightly concave, surface shining, the first two whorls nearly uniformly light brown in adult specimens, 3rd, 4th, 5th and 6th, brown, obliquely marked with white zigzag lines, last whorl lighter colored than the upper whorls, gradually becoming lighter and nearly pure white just in back of the lip and furnished with a white band just below the periphery, the upper margin of the band is bordered by a slightly darker shade of brown; whorls 7, first five slightly convex, the last very much inflated, forming a little more than half of the shell, rounded at the periphery; suture simple and slightly impressed; columella simple, white, nearly straight, slightly convex below, broader above and covering a deep circular umbilicus; aperture large, semiovate, white within; margin of the lip thin, edged on the outside with a very narrow dark line, slightly thickened within.

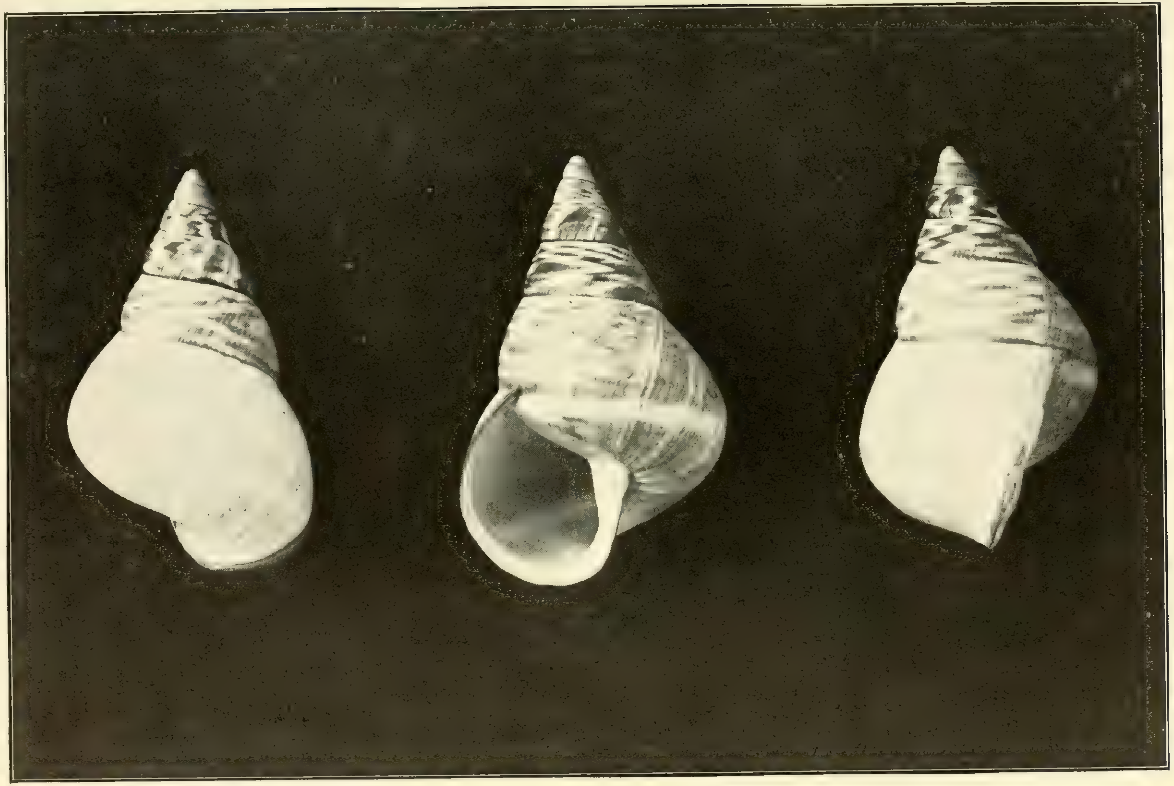
Length 24 mm. diam. (diagonal) 14 mm.; aperture, length 12 mm., diam. 9.3 mm.

Embryo: light brown with a narrow dark brown peripheral band, bordered on both sides by a white band and with broad indistinct irregular stripes. There were about four to each pregnant specimen.

Habitat: Waialohe, Kapua, South Kona, Hawaii: About one-half mile above Government Road; on Pua trees, very scarce. (A. Gouveia.)

Holotype: B. P. B. Museum, No. 49227, paratypes, Academy of Natural Science, Phil., and Gouveia Collection, Nos. 338, 404—3-6-7-8 and 429.

This form is provisionally placed as a variety of *P. horneri* although their habitats are widely separated. *P. h. kapuana* agrees with *P. horneri* in texture of the surface. It differs, however, in its narrower form, more rounded periphery and darker juvenile whorls. From *P. confusa* it differs in its smoother surface, more regularly coiled spire, and lighter and more distinct color pattern.



PARTULINA HORNERI (BALDWIN) VAR KAPUANA

× 2. 3. The plate shows three different specimens. The center figure is the holotype.

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VOL. VII, No. 7

WITH PLATE XVI

NEW SPECIES OF SIEROLA WITH EXPLANATORY NOTES

BY

DAVID T. FULLAWAY

HONOLULU, HAWAII
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With Plate XVI

NEW SPECIES OF SIEROLA WITH EXPLANATORY NOTES

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David T. Fullaway

HONOLULU, HAWAII
Bishop Museum Press
1920

New Species of Sierola With Explanatory Notes

By David T. Fullaway.

INTRODUCTION.

The genus *Sierola* was established by Cameron in 1881,[1] to receive a bethylid sent from the Hawaiian Islands by the Rev. Thomas Blackburn. Only one species was originally included, which was later designated by Ashmead[2] as the type. Two additional species were described by Cameron[3] from Blackburn's collections in 1886, and in 1901 Ashmead[4] described five more, from the collections made by Dr. R. C. L. Perkins under the auspices of the Bernice Pauahi Bishop Museum, Royal Society of London and British Association for the Advancement of Science. In 1910 Perkins[5] described another, bringing the number of species from Hawaii to nine.

Dr. Perkins,[6] in the Introduction to the Fauna Hawaiiensis, stated: "The species of *Sierola* are apparently somewhat variable and not always easily distinguished and I rather suspect that they were more numerously represented in my collections than is shown by Ashmead's discrimination of them." After several years of study of examples of *Sierola*, lent me by different collectors in Hawaii, I am convinced that the suspicions entertained by Dr. Perkins were well grounded, for out of five hundred specimens examined I am able to distinguish one hundred and seventy-one distinct forms, which I am herewith describing as new species, or subspecies, providing a table for their separation from each other and from the only other species known to me, *Sierola dichroma* Perkins.

I regret that I am unable to see the types of the species described by Cameron and Ashmead, for it is more than likely that some of their species are re-described by me. Their descriptions are inadequate, and could be applied to a number of distinct forms in the collections I have examined, while the named material in the Bishop Museum examined by myself and in the U. S. National Museum examined by Mr. Timberlake has in many instances several distinct forms under one name, and is useless for identifying any of the previously-described species. The characters which I have employed to distinguish species are obvious characters but their use necessitates a very careful examination of the specimens in hand and fine discrimination. While I have seen many distinct male forms, I have not cared to describe any that cannot be associated with their females, for the two sexes are often strikingly different and confusion would be the inevitable result. Ultimately, I believe, many more species will be reared from their hosts, the larvæ of Lepidoptera, and the relation of male and female forms established. The multiplicity of forms will astonish some, but this condition is paralleled in many other genera of Hawaiian insects; in fact, a meagre and scattered representation of the families and genera of insects existing on the continents and the presence of many numerically large genera are the outstanding features of the Hawaiian fauna.

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[1] Trans. Ent. Soc. Lond. 1881, p. 556.

[2] Bul. 45, U. S. N. M., p. 55.

[3] P. Manch. Soc. XXV, p. 176-177; Mem. Manch. Soc. (3) X, 1886, p. 237-238.

[4] Fauna Hawaiiensis I (3), p. 290-292.

[5] Fauna Hawaiiensis II (6), p. 614.

[6] Fauna Hawaiiensis I (6), p. XCIX.

In 1900 the genus was found to be represented in Australia as well as in Hawaii. Ashmead[7] described in that year two species from New South Wales to which Turner,[8] in 1915, added a third from Southwest Australia. Representatives of the genus have also been found by Muir in Fiji and Southern China and are described herewith. The range of the genus, which was once thought to be confined to the Australian Region, appears likely to prove very wide.

The types of the species herein described are deposited in the Bernice Pauahi Bishop Museum at Honolulu.

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[7] P. Linn. Soc. N. S. Wales, XXV, pp. 328-329.
[8] Proc. Zool. Soc. 1915, p. 68.

KEY TO THE KNOWN HAWAIIAN SPECIES OF SIEROLA.

FEMALES.

1-284	Head extended in front of the eyes, anterior margin angulate, sometimes with a clypeal horn	
2-23	Clypeal process large	
3-12	Clypeal process spatulate	
4-5	Clypeal process decurved, dorsally convex, without carina	1. *distincta*
5-4	Clypeal process horizontal, dorsally flat or elevate and carinate	
6-9	Clypeal process dorsally flat and carinate.	
7-8	Shining black	2. *armata*
8-7	Dull black, particularly on the head	3. *nigrescens*
9-6	Clypeal process medially longitudinally elevate and carinate	
10-11	Clypeal process apically obtusely angulate, head considerably longer than wide	4. *volcanica*
11-10	Clypeal process apically acutely angulate, head only a little longer than wide	5. *acuta*
12-3	Clypeal process not spatulate, either a semicircular or transverse lamina or spicate	
13-14	Clypeal process a semicircular lamina	6. *magna*
14-13	Clypeal process not semicircular, either transverse or spicate	
15-20	Clypeal process transverse	
16-17	Clypeal process simple, not rostrate, head strongly protuberant beneath	7. *kauensis*
17-16	Clypeal process rostrate	
18-19	Head and thorax shining black	8. *notabilis*
19-18	Head and thorax dull black	9. *sima*
20-15	Clypeal process spicate	
21-22	Head smooth and polished, punctuation fine, longer behind, narrower between the eyes than var. *hawaiiensis*	10. *spicata*
22-21	Distinctly sculptured, punctuation coarse, wider between, shorter behind the eyes than Oahu form	11. *spicata* subspecies *hawaiiensis*
23-2	Clypeal process small	
24-29	Clypeal process spicate	
25-26	Body thick-set	12. *nitida*
26-25	Body slender	
27-28	Body particolored	13. *bella*
28-27	Body entirely black	14. *gracilis*

29-24	Clypeal process not spicate, either spatulate or simple	
30-41	Clypeal process spatulate, distinctly contracted at the base	
31-32	Head considerably longer than wide	15. *curvignatha*
32-31	Head as wide as long or nearly so	
33-36	Vertical margin of the head conspicuously concave	
34-35	Vertical emargination deep, head a little wider than long, expanded behind the eyes, clypeal process short	16. *emarginata*
35-34	Vertical emargination shallow, head a little longer than wide, clypeal process moderately long	17. *giffardi*
36-33	Vertical margin of the head straight or nearly so	
37-38	Head a little longer than wide, width between the eyes only slightly exceeding the length from eyes to vertex	18. *suttoniae*
38-37	Head as wide as long, width between the eyes considerably more than the length from eye to vertex	
39-40	Head large, shining black	19. *muiri*
40-39	Head small, brilliant black, length behind the eyes not great	20. *rocki*
41-30	Clypeus simple, without contraction at the base, either carinate or flat dorsally	
42-59	Clypeus without carina	
43-46	Body particolored	
44-45	Head almost smooth and shining	21. *bicolor*
45-44	Head coarsely sculptured and dull, opaque or nearly so	22. *aristoteliae*
46-43	Body entirely black	
47-50	Body thick-set, not slender or depressed	
48-49	Width between the eyes not much greater than the length from eye to vertex, temples full	23. *anthracina*
49-48	Width between the eyes nearly twice the length from eye to vertex, temples rounded	24. *konana*
50-47	Body more or less slender or depressed, not thick-set	
51-54	Head much longer than wide	
52-53	Legs fuscous to black	25. *angustata*
53-52	Legs luteous	26. *levis*
54-51	Head as wide as long or nearly so	
55-56	Slender, somewhat depressed, head without great depth, antennæ short, propodeum smooth	27. *brevicornis*

56-55	Not noticeably depressed, head tumid beneath, propodeum rugulose	
57-58	Head as wide as long, depth at least two thirds the length, gula protuberant behind and divided into two lobes with a sulcus between, mandibles long and slender	28. *montana*
58-57	Head longer than wide, depth less than two-thirds the length, gula not protuberant, mandibles stout, bent in the middle, distal portion twisted and flattened	29. *peleana*
59-42	Clypeus carinate	
60-89	Large forms, 3 mms. or more in length	
61-70	Head considerably longer than wide	
62-65	Long, slender forms, body a little depressed	
63-64	Width between the eyes considerably more than the length from eye to vertex, head tumid beneath	30. *kaala*
64-63	Width between the eyes equalling the length from eye to vertex, head convex beneath	31. *usitata*
65-62	Thick-set forms, the body not depressed	
66-69	Shining black	
67-68	Legs fuscous to black, mandibles concavo-convex, wings with faint yellowish-brown pigmentation	32. *carinata*
68-67	Legs yellowish-brown, mandibles bent at the middle, distal portion flattened, wings hyaline	33. *koa*
69-66	Dull black	34. *pilosa*
70-61	Head not much, if any, longer than wide	
71-84	Head a little longer than wide	
72-73	Body somewhat depressed, mandibles abnormally large	35. *megalognatha*
73-72	Body thick-set, mandibles normal	
74-79	Shining black	
75-76	Antennæ no longer than the head, width between the eyes equalling length from eye to vertex	36. *tantalea*
76-75	Antennæ longer than the head, width between the eyes greater than the length from eye to vertex	
77-78	Antennal segments considerably longer than wide, punctuation of the head coarse and irregular, propodeum coarsely rugulose	37. *compacta*
78-77	Antennal segments only a little longer than wide, punctuation of the head finer and more regular than in *compacta*, propodeum with a fine surface sculpture	38. *osborni*
79-74	Dull black	
80-81	Wings with a fuscous pigmentation	39. *fuscipennis*

81-80	Wings without pigmentation, or if pigmented, the pigmentation not fuscous	
82-83	Wings hyaline	40. *longicaudata*
83-82	Wings with a yellowish brown pigmentation, gula strongly protuberant	41. *laticeps*
84-71	Head as wide as or wider than long	
85-86	Pin punctures on the head very fine	42. *localis*
86-85	Punctuation of the head more or less coarse	
87-88	Head dull black, opaque	43. *obscura*
88-87	Head more shining	44. *levigata*
89-60	Smaller forms, less than 3 mms. in length	
90-97	Slender forms	
91-94	Length of the head twice the width	
92-93	Head with a rather coarse surface sculpture	45. *tenuis*
93-92	Head smooth, glabrous	46. *depressella*
94-91	Length of the head less than twice the width	
95-96	Punctuation of the head rather coarse, legs and antennæ fuscous brown	47. *glabra*
96-95	Punctuation of the head fine, legs and antennæ flavous	48. *flavicornis*
97-90	Forms not remarkably slender	
98-211	Head longer than wide	
99-100	Yellowish-brown in color, often infuscate	49. *timberlakei*
100-99	Not so, particolored or black	
101-106	Particolored, yellowish brown and black	
102-103	Thorax and abdomen yellowish brown to fuscous, head black	50. *pulchra*
103-102	Thorax as well as the head black, or if brown, then not entirely so	
104-105	Thorax and head black, posterior margin of the abdominal segments only yellowish brown	51. *pubescens*
105-104	Head and most of the thorax black, prothorax and abdomen partially yellowish brown	52. *seminigra*
106-101	Body entirely black	
107-108	Wings with a fuscous pigmentation	53. *fuscipes*
108-107	Not so	
109-126	Wings with yellowish brown pigmentation	
110-111	Depressed, without great thickness dorso-ventrally	54. *flavipennis*
111-110	Not depressed, dorso-ventrally thick	
112-115	Shining black, somewhat brilliant	
113-114	Legs and antennæ flavous, width between the eyes one and one-half times the length from eye to vertex, punctuation of the head fine	55. *lepida*
114-113	Legs and antennæ fuscous, width between the eyes and length from eye to vertex equal, punctuation of the head coarse	56. *callida*

115-112	Duller species, without brilliancy	
116-123	Faintly shining but not opaque	
117-118	Antennæ considerably longer than the head, length of the segments throughout more than twice the width	57. *longicornis*
118-117	Antennæ not much longer than the head, length of the segments scarcely exceeding the width	
119-120	Mandibles slender, hairy clothing conspicuous	58. *scoriacea*
120-119	Mandibles stout, hairy clothing inconspicuous	
121-122	Head considerably longer than wide, legs fuscous	59. *gracillima*
122-121	Head not much longer than wide, legs dark brown	60. *brunneipes*
123-116	Opaque, or nearly so	
124-125	Punctuation of the head extremely fine and inconspicuous, head almost impunctate	61. *arida*
125-124	Punctuation of the head fairly coarse and distinct	62 *punctata*
126-109	Wings hyaline, subinfuscate, or with only a faint yellowish brown pigmentation	
127-152	Shining black, rather brilliant	
128-131	Piceous, not deep black	
129-130	Somewhat depressed and flat, head only a little longer than wide, mandibles a little slender, wings subinfuscate, with a faint yellowish brown pigmentation	63. *brunnea*
130-129	Not depressed, length of the head nearly twice the width, mandibles stout, apical half flattened, wings hyaline	64 *picea*
131-128	Deep black	
132-133	Mandibles abnormally large, bent near the base, where they are slender, distal portion rather stout, twisted and flattened	65. *streblognatha*
133-132	Not so	
134-141	Mandibles slender	
135-136	Length of the head nearly twice the width	66. *opacula*
136-135	Length of the head not more than one and one-half times the width	
137-140	Head smooth and glabrous, mandibles black, legs yellowish brown to fuscous, propodeum smooth	
138-139	Head narrowing behind the eyes, antennæ reaching the mesoscutum	67. *mandibularis*
139-138	Sides of the head parallel or nearly so, antennæ only a little longer than the head	68 *minuta*
140-137	Head rough and hairy, mandibles, legs and base of antennæ light yellowish brown, propodeum rugose	69. *hirsuta*

141-134	Mandibles stout	
142-143	Antennæ longer than the head, segments of the flagellum longer than wide	70. *striata*
143-142	Antennæ scarcely longer than the head, segments of the flagellum mostly as wide as or wider than long	
144-145	First two segments of the funicle a little longer than wide	71. *agens*
145-144	Segments of the flagellum throughout as wide as or wider than long	
146-147	Base of the mandibles not quite reaching the eye	72. *pygmaea*
147-146	Base of the mandibles touching the eye	
148-149	Abdomen somewhat tumid beneath	73. *tumidoventris*
149-148	Not so	
150-151	Punctuation of the head close and somewhat coarse	74. *koolauensis*
151-150	Punctuation of the head fine, irregular, rather remote	75. *koebelei*
152-127	Dull black, not at all brilliant	
153-200	Dull black, only faintly shining but not opaque	
154-187	Mandibles slender	
155-156	Length of the head twice the width or nearly so	76. *longiceps*
156-155	Length of the head not nearly twice the width	
157-164	Head longer than wide by a half	
158-159	Width between the eyes no more than the length from eye to vertex, mandibles mostly brown, abdomen elongate ovate, antennæ not much longer than the head	77. *rugulosa*
159-158	Width between the eyes a little more than the length from eye to vertex	
160-161	Antennæ reaching the scutellum, abdomen short ovate, mandibles flattened distally	78. *brevicauda*
161-160	Antennæ shorter, not reaching the scutellum	
162-163	Sculpture and punctuation of the head fine	79. *kilauea*
163-162	Sculpture and punctuation of the head coarse	80. *olympiana*
164-157	Head only a little longer than wide	
165-174	Width between the eyes considerably more than the length from eye to vertex	
166-169	Mandibles mostly yellowish or reddish brown	
167-168	Sculpture and punctuation of the head and thorax extremely fine	81. *tenebriosa*
168-167	Sculpture and punctuation of the head and thorax fairly coarse	82. *capuana*
169-166	Mandibles mostly black	

170-173 Antennal segments throughout longer than wide, base of the mandibles not quite reaching the eye

171-172 Legs light yellowish brown, wings hyaline, hairy clothing short and inconspicuous 83. *megalops*

172-171 Legs fusco-testaceous, wings with a faint yellowish brown pigmentation, hairy clothing long and thick 84. *vestita*

173-170 Antennal segments beyond the pedicel scarcely longer than wide, base of the mandibles touching the eye 85. *mauiensis*

174-165 Width between the eyes only a little more than the length from eye to vertex

175-178 Mandibles mostly reddish or yellowish brown

176-177 Antennæ reaching the scutellum, mandibles abnormally large, propodeum coarsely rugulose 86. *rufignatha*

177-176 Antennæ only a little longer than the head, mandibles normal, propodeum not coarsely rugulose 87. *lugens*

178-175 Mandibles mostly black

179-184 Antennal segments longer than wide

180-181 Wings nearly hyaline, mandibles reddish brown basally 88. *swezeyi*

181-180 Wings faintly but evidently pigmented

182-183 Legs yellowish brown, wings with decided yellowish brown pigmentation 89. *eucrena*

183-182 Legs fuscous to black, wings with fuscous pigmentation 90. *ehrhorni*

184-179 Antennal segments as wide as long

185-186 Abdomen long and slender, wings with fuscous pigmentation, punctuation and hairy clothing of the head conspicuous, punctuation coarse. mandibles stout 91. *kaduana*

186-185 Abdomen short and stout, wings hyaline, punctuation and hairy clothing of the head finer and inconspicuous, mandibles rather slender 92. *gracilariae*

187-154 Mandibles stout

188-193 Head considerably longer than wide

189-190 Mandibles mostly yellowish brown 93. *incita*

190-189 Mandibles mostly black

191-192 Legs and antennæ yellowish brown, punctuation close, fine and shallow, hairy clothing short and delicate 94. *cryptophlebiae*

192-191 Legs and antennæ infuscate, not entirely yellowish brown 95. *polita*

193-188 Head only a little longer than wide

194-195 Mandibles mostly reddish brown 96. *lanihuliana*

195-194 Mandibles mostly black
196-197 Antennæ not reaching the mesoscutum, all the segments beyond the pedicel as wide as or wider than long 97. *nigrita*
197-196 Antennæ reaching the mesoscutum, segments of the flagellum with the exception of the third longer than wide
198-199 Sculpture and punctuation of the head fine 98. *hillebrandi*
199-198 Sculpture and punctuation of the head coarse 99. *affinis*
200-153 Dull black and opaque, not at all shining
201-210 Mandibles slender
202-205 Legs luteous
203-204 Hairy clothing long and thick, punctuation very close, propodeum rugulose, flat dorsally 100. *opogonae*
204-203 Hairy clothing inconspicuous, punctuation rather remote, propodeum rugose, convex 101. *luteipes*
205-202 Legs brown
206-207 Mandibles reddish brown except at the base, where they are black 102. *pilifera*
207-206 Mandibles black except at the apex, where they are reddish
208-209 Head longer than wide by a half, base of the mandibles touching the eye, wings with yellowish brown pigmentation 103. *sericea*
209-208 Head only a little longer than wide, narrowing behind, base of mandibles not reaching the eye, wings subinfuscate 104. *robusta*
210-201 Mandibles stout, hairy clothing of stiff white hairs, wings with a faint fuscous pigmentation 105. *setosa*
211-98 Head as wide as long
212-243 Shining, rather brilliant black or brown
213-230 Mandibles slender
214-215 Yellowish to fuscous brown throughout 106. *batrachedrae*
215-214 Body particolored or black
216-217 Body particolored, black except the prothorax, which is yellowish brown 107. *similaris*
217-216 Body entirely black
218-225 Antennæ reaching the mesoscutum or beyond
219-220 Median line of the gula with deep sulcus posteriorly 108. *fossulata*
220-219 Not so
221-222 Legs and antennæ fuscous 109. *fusca*
222-221 Not so
223-224 Legs and mandibles, except at base, and antennæ basally, croceous, head finely punctate, very tumid beneath, the depth under eye equalling length from eye to vertex 110. *croceipes*

224-223 Legs and antennæ basally yellowish brown, mandibles black, head coarsely punctate, tumidity beneath less pronounced 111. *puuwaawaa*

225-218 Antennæ not much longer than the head

226-227 Legs and antennæ luteous to yellowish brown, mandibles reddish brown, wings hyaline 112. *minuscula*

227-226 Legs and antennæ brown to fuscous, wings with a faint pigmentation

228-229 Wings with a faint fuscous pigmentation 113. *anemophila*

229-228 Wings with a faint yellowish brown pigmentation 114. *brunneipennis*

230-213 Mandibles stout

231-232 Body particolored, prothorax, mesoscutum and abdomen yellowish brown 115. *mandibulata*

232-231 Body entirely black

233-234 Gula divided into two lobes posteriorly by a deep median sulcus 116. *tuberculata*

234-233 Not so

235-238 Mandibles reddish or yellowish brown

236-237 Punctuation of the head fine and close, width between the eyes one and one-half times the length from eye to vertex, a little tumid beneath, antennæ nearly reaching the scutellum 117. *nigra*

237-236 Punctuation of the head rather coarse and remote, width between the eyes twice the length from eye to vertex, convex beneath, antennæ reaching mesoscutum 118. *manoa*

238-235 Mandibles black; if red, then only at the apex

239-240 Antennæ only a little longer than the head, all the segments beyond the pedicel as wide as or wider than long 119. *lata*

240-239 Antennæ reaching the mesoscutum, segments throughout twice as long as wide

241-242 Width between the eyes one and one-half times the length from eye to vertex, propodeum coarsely rugulose, wings subinfuscate 120. *fuliginosa*

242-241 Width between the eyes twice the length from eye to vertex, propodeum finely rugulose, wings with a yellowish brown pigmentation 121. *vulcana*

243-212 Dull black, not at all brilliant

244-263 Mandibles slender

245-252 Legs mostly fuscous

246-247 Head with lateral margins parallel, not converging behind the eyes 122. *nigrans*

247-246 Head narrowing behind the eyes

248-249 Antennæ yellowish brown basally 123. *olinda*

249-248	Antennæ fuscous		
250-251	Width between the eyes twice the length from eye to vertex	124.	*indecora*
251-250	Width between the eyes considerably less than twice the length from eye to vertex	125.	*nubila*
252-245	Legs wholly or partly luteous or yellowish brown		
253-256	Mandibles yellowish brown outwardly		
254-255	Propodeum delicately sculptured, almost smooth	126.	*epagogeana*
255-254	Propodeum rugulose	127.	*abusa*
256-253	Mandibles black		
257-260	Legs luteous or flavous		
258-259	Head smooth, rather remotely punctate, gula as long as wide, abdomen short, wings hyaline	128.	*similis*
259-258	Head rough, rather closely punctate, gula wider than long, abdomen long, wings with a yellowish brown pigmentation	129.	*flavipes*
260-257	Legs yellowish brown		
261-262	Antennæ reaching the scutellum	130.	*amica*
262-261	Antennæ not reaching beyond the mesoscutum	131.	*quadriceps*
263-244	Mandibles stout		
264-269	Mandibles luteous except at the base		
265-266	Punctuation of the head remote	132.	*williamsi*
266-265	Punctuation of the head close		
267-268	Legs luteous	133.	*kaalensis*
268-267	Legs yellowish brown to fuscous	134.	*imparata*
269-264	Mandibles black		
270-275	Legs yellowish brown		
271-272	Antennal segments beyond the pedicel scarcely longer than wide	135.	*pembertoni*
272-271	Antennal segments beyond the pedicel considerably longer than wide		
273-274	Punctuation of the head coarse and a little remote, propodeum delicately sculptured	136.	*lacessita*
274-273	Punctuation of the head fine and rather close, propodeum finely rugulose	137.	*conspicua*
275-270	Legs fuscous		
276-279	Width between the eyes twice the length from the eye to the vertex		
277-278	Punctuation of the head a little coarse and somewhat remote, hairy clothing short and inconspicuous	138.	*adumbrata*
278-277	Punctuation of the head rather fine and close, hairy clothing long and delicate	139.	*illingworthi*
279-276	Width between the eyes less than twice the length from eye to vertex		
280-281	Head with the lateral margins parallel, not converging behind the eyes	140.	*nemorensis*

281-280	Head narrowing behind the eyes		
282-283	Punctuation of the head extremely fine, hairy clothing long and delicate, segments of the antennæ as wide as long	141.	*vetusta*
283-282	Punctuation of the head rather coarse, hairy clothing short and inconspicuous, segments of the antennæ considerably longer than wide	142.	*kalihiensis*
284-1	Head not extended in front of the eyes, anterior margin transverse		
285-290	Large species, over 3 mms. in length		
286-287	Thick-set, head longer than wide, clypeus nearly flat, wings with yellowish brown pigmentation	143.	*aucta*
287-286	Not so		
288-289	Width between the eyes more than twice the length from eye to vertex, segments of the antennæ throughout considerably longer than wide	144.	*breviceps*
289-288	Width between the eyes less than twice the length from eye to vertex, segments of the antennæ beyond the first funicle segment as wide as or wider than long	145.	*bridwelli*
290-285	Smaller species, 3 mms. in length or less		
291-298	Species more or less flattened, without great thickness dorso-ventrally		
292-293	Depressed to an extreme degree, mandibles black	146.	*depressa*
293-292	Less strongly depressed, mandibles brown or flavous		
294-295	Head longer than wide by a half	147.	*philodoriae*
295-294	Head not much longer than wide		
296-297	Legs, antennæ and mandibles flavous	148.	*planiceps*
297-296	Legs, antennæ and mandibles fuscous to black	149.	*holomelaena*
298-291	Species not dorso-ventrally flattened		
299-304	Slender species		
300-301	Thickly clothed with hair, mandibles black	150.	*hirticeps*
301-300	Hairy clothing short and inconspicuous, mandibles yellowish or reddish brown		
302-303	Head longer than wide by more than a half, mandibles reddish brown, the base not reaching the eye, gula longer than wide, propodeum rugulose	151.	*tenuiceps*
303-302	Head longer than wide by less than a half, mandibles yellowish brown, the base touching the eye, gula no longer than wide, propodeum delicately sculptured	152.	*nitens*
304-299	Species not remarkably slender		
305-320	Brilliant, not at all dull		

306-309 Body particolored

307-308 Abdomen yellowish brown to piceous, head and thorax remotely punctate, width between the eyes greater than the length from eye to vertex, antennæ reaching mesoscutum, mandibles slender, upper angle of the base touching the eye, wings with deep yellowish brown pigmentation 153. *kaumuohona*

308-307 Only the apical margin of abdominal segments brown, punctuation of head and thorax close, width between the eyes equalling the length from eye to vertex, antennæ no longer than the head, mandibles stout, base not reaching the eye, wings with a faint yellowish brown pigmentation 154. *brunneiventris*

309-306 Body entirely black

310-313 Head longer than wide by a half

311-312 Mandibles as well as the abdomen short, wings with a faint fuscous pigmentation 155. *blackburni*

312-311 Mandibles as well as the abdomen rather long, wings hyaline 156. *celeris*

313-310 Head not much longer than wide

314-317 Antennal flagellum mostly fuscous

315-316 Head narrowing behind the eyes, tumid beneath, segments of the antennæ throughout longer than wide, mandibles slender, gula and sides of the head flat, wings with a faint yellowish brown pigmentation 157. *perkinsi*

316-315 Head with the lateral margins parallel, not converging behind, convex beneath, segments of the antennæ beyond first funicle segment as wide as or wider than long, mandibles stout, gula and sides of the head a little convex, wings faintly fuscous 158. *perottetiae*

317-314 Antennal flagellum mostly yellowish brown

318-319 Legs somewhat infuscate, first funicle segment longer than wide, mandibles touching the eye at the base 159. *humilis*

319-318 Legs entirely brown, first funicle segment as wide as long, base of the mandibles not reaching the eye 160. *proxima*

320-305 Dull shining or opaque, not at all brilliant

321-338 Dull, only faintly shining but not opaque

322-323 Body particolored, mostly brown **dichroma P.**

323-322 Body entirely black

324-329 Mandibles stout

325-326	Head widest across the eyes, narrowing behind and in front, segments of the antennæ throughout longer than wide	161.	*langfordi*
326-325	Head with the lateral margins parallel, not converging behind the eyes, segments of the antennæ not longer than wide throughout		
327-328	Head longer than wide by a half, punctuation coarse, hairy	162.	*aspera*
328-327	Head only a little longer than wide, punctuation fine, hairy clothing inconspicuous	163.	*atra*
329-324	Mandibles slender		
330-331	Head as wide as long	164.	*newelli*
331-330	Head longer than wide		
332-335	Head widest across the eyes, narrowing behind and in front		
333-334	Head considerably longer than wide, vertical margin straight, mandible touching the eye at the base, abdomen ovate	165.	*waianaeana*
334-333	Head only a little longer than wide, vertical margin slightly convex, base of the mandible not reaching the eye, abdomen short ovate, apically acuminate	166.	*distinguenda*
335-332	Head with the lateral margins parallel, not converging behind the eyes		
336-337	Mandibles marked with red, nearly but not quite reaching the eye at the base, median groove of the gula nearly effaced, propodeum rugulose	167.	*rufomandibulata*
337-336	Mandibles black, touching the eye at the base, gula with a shallow depression along the median line, propodeum delicately sculptured	168.	*curiosa*
338-321	Opaque, not at all shining		
339-340	Head longer than wide by a half, clothed with long silvery hairs	169.	*subcrispa*
340-339	Head as wide as long or nearly so, hairy clothing short and inconspicuous		
341-342	Head a little longer than wide, only the pedicel and first three funicle segments of antennæ longer than wide, mandibles slender, wings with fuscous pigmentation	170.	*nuda*
342-341	Head as wide as long, narrowing behind the eyes, width between the eyes nearly twice the length from eye to vertex, antennal segments throughout considerably longer than wide, mandibles stout, wings with a yellowish brown pigmentation	171.	*willardi*

DESCRIPTIONS OF NEW HAWAIIAN SPECIES.

1. *Sierola distincta* n.sp.

Plate XVI, Figure 1.

♀ brilliant black, with the exception of the propodeum, which is dull; legs and antennæ yellowish brown, the latter fuscous outwardly.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture and a few scattered setiferous punctures. Head considerably longer than wide, widest across the eyes, width between the eyes scarcely more than the length from the eye to the vertex; flatly convex above, depressed in front, flat beneath, the greatest depth considerably behind the eyes, the gula considerably longer than the occiput; vertical margin slightly concave, temples rounded, eyes convex, antennæ long, reaching the scutellum, all the segments more than twice as long as wide, antennal fossæ deep; clypeal process a spatulate decurved beak, convex above; mandibles large, bent near the middle, the distal portion stout, concavo-convex, obliquely truncate apically and toothed, base not nearly reaching the eye, cheeks moderately long; gula and sides of the head flat, the former as wide as long, with distinct median furrow, anterior margin arcuately concave, posterior margin incised; propodeum rugose, with an acute triangular area at its base smooth; abdomen elongate ovate, smooth; wings subinfuscate, nearly hyaline; length 3 mms.

♂ with yellowish brown mandibles; smaller than the ♀, head shorter, antennæ more slender, cheeks shorter, abdomen blunt at apex.

Described from twenty females and eleven males (type, allotype and paratypes). Type, allotype, and one ♀ paratype Opaeula, Oahu, collected by O. H. Swezey, March 30, 1913. Paratypes: 1 ♀ Hauula, Swezey, August 15, 1914; 1 ♀ Tantalus (1300 ft.), Giffard October 15, 1905; 5 ♀ Tantalus (1500 ft.), Giffard, August 27 and December 22, 1918; 1 ♀ Tantalus, Fullaway March 20, 1900; 1 ♀ Tantalus (2000 ft.), Kotinsky; 1 ♀ Nuuanu, Fullaway September 4, 1916; 1 ♀ Kuliouou, Timberlake June 25, 1916; 1 ♀ Manoa Cliffs on *Campylotheca,* Timberlake September 1, 1918; 1 ♀ Palolo Crater, Timberlake September 8, 1918; 1 ♀ S. E. Koolau Mts., Bridwell June, 1918; OAHU: 2 ♀ Kilauea (4000 ft.), Giffard October 15 and January 19, 1916, 1 ♀ Kilauea (4000 ft.), Giffard and Muir, January 13, 1917; 1 ♀ 29 miles Olaa, Fullaway, November 19, 1913; HAWAII: 1 ♂ Tantalus (1500 ft.), Giffard December 22, 1915; 2 ♂ Nuuanu, Fullaway, August 20, 1916, and April 1, 1917; 1 ♂ Manoa, Fullaway, July 29, 1917; 2 ♂ Olympus Mt., Timberlake September 8, 1918; 3 ♂ Palolo Crater on *Straussia kaduana,* Timberlake September 29, 1918; 1 ♂ Palolo Crater on *Pelea clusiaefolia,* Timberlake September 28, 1918; OAHU.

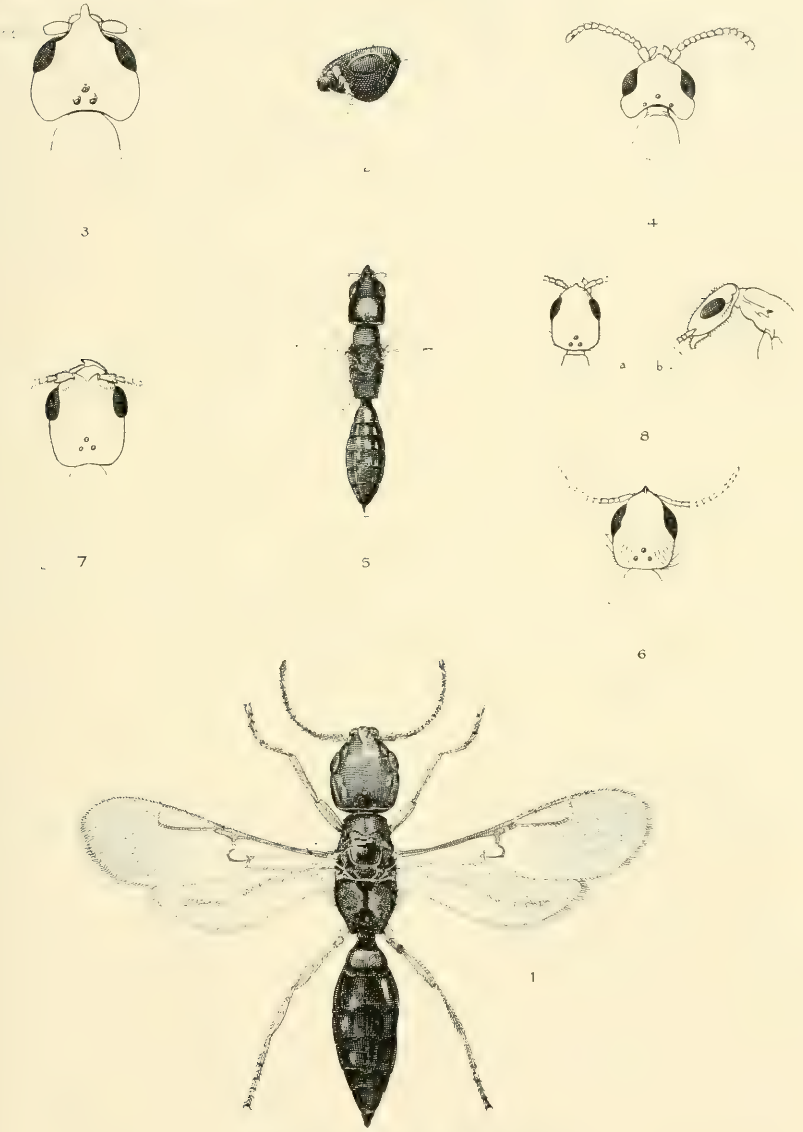
A variable species. Some of the Hawaii specimens are not quite typical.

Type: Cat. No. 1, Bishop Museum.

2. *Sierola armata* n.sp.

♀ shining black but not brilliant, antennæ and legs yellowish brown to fuscous.

Head and thorax to the propodeum with a microscopically fine, reticu-



NEW SPECIES OF SIEROLA.

Fig. 1. Sierola distincta ♀ dorsal aspect with wings spread to display venation Fig. 2. S. kauensis ♀ head, lateral aspect. Fig. 3. S. spicata ♀ outline of the head, dorsal aspect. Fig. 4. S emarginata ♀ outline of the head, dorsal aspect. Fig. 5. S. levis ♀ dorsal aspect of body. Fig. 6. S. pilosa ♀ outline of the head, dorsal aspect. Fig. 7. S. aucta ♀ outline of the head, dorsal aspect. Fig. 8. S. depressa ♀ outline of the head. a, dorsal; b, lateral aspect. (All greatly magnified.)

late surface sculpture, only fairly closely and finely punctate and clothed with short and delicate hairs. Head considerably longer than wide, widest at the vertex, narrowing in front, flatly convex above, a little tumid beneath, greatest depth beneath the posterior end of the eye; vertical margin straight, temples rounded, eyes flatly convex, antennæ a little longer than the head, pedicel twice as long as wide, funicle narrower and not quite so long, following segments a little longer than wide, almost moniliform, antennal fossæ deep; clypeal process a spatulate beak horizontally extended, flat above and finely carinate; mandibles slender, bent near the middle, the distal portion flattened, obliquely truncate apically and toothed, base not reaching the eye, cheeks moderately long; gula and sides of the head slightly convex, the former as wide as long, anterior and posterior margins incised, median groove evident but very fine; propodeum rugose; abdomen elongate ovate, smooth and polished; wings subinfuscate; length 3 mms.

♂ with the mandibles, legs and antennæ basally luteous, considerably smaller than the ♀, head shorter and widest across the eyes, antennæ more slender, clypeal process smaller, cheeks shorter, abdomen blunt at the apex.

Described from seven females and four males (type, allotype, and paratypes). Type collected on Kaala Mt., Oahu, by O. H. Swezey, September 7, 1913; one ♀ and two ♂, allotype and paratypes, at Nuuanu Pali, Oahu, by Fullaway, April 1, 1917. Paratypes: 4 ♀ and 1 ♂ Kaumuohona, Oahu, Timberlake September 9, 1917; 1 ♀ and 1 ♂ Tantalus, Oahu, Giffard, August 27 and December 22, 1918.

Type: Cat. No. 2, Bishop Museum.

3. *Sierola nigrescens* n.sp.

♀ moderately slender, head and thorax dull black, abdomen brilliant, legs, antennæ and mandibles fuscous.

Head and thorax with a very fine, reticulate surface sculpture, finely and only fairly closely punctate, hairy clothing short but rather thick beneath. Head a little longer than wide, widest at the posterior end of the eyes, narrowing slightly behind and in front, width between the eyes a little more than the length from the eye to the vertex, flatly convex above, a little tumid beneath, the greatest depth behind the eyes; vertical margin straight, temples rounded, eyes flatly convex, antennæ reaching the mesoscutum, segments of the flagellum all longer than wide, pedicel twice as long as wide, antennal fossæ deep, clypeal process a spatulate beak horizontally extended, flat above and finely carinate; mandibles bent near the middle, the distal portion flattened, truncate and blunt toothed on apical margin, the base not reaching the eye; cheeks narrow; gula and sides of the head flat, the former as wide as long, anterior margin semicircularly concave, posterior margin incised; abdomen smooth, elongate and a little depressed; wings subinfuscate; length 2.75 mms.

Described from one female (type) collected at Kilauea, Hawaii, in the dry forest, 4000 ft. elev., by W. M. Giffard, July 6, 1918.

Type: Cat. No. 3, Bishop Museum.

4. *Sierola volcanica* n.sp.

♀ shining black, antennæ basally, trochanters, tibiae and tarsi brown to fuscous.

Head and thorax to the propodeum with a microscopically fine surface sculpture, finely and only fairly closely punctate and hairy. Head wider than the thorax, considerably longer than wide, width between the eyes a little more than the length from eye to vertex; flatly convex above, a little tumid beneath, the greatest depth behind the eyes; vertical margin straight, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, all the segments of the flagellum longer than wide, the pedicel twice as long as wide, antennal fossæ deep; clypeal process spatulate, horizontally extended, medially longitudinally elevate and carinate but apically not greatly exceeding anterior margin of the head; mandibles abnormally large, bent at the middle, distal portion flattened, obliquely truncate and toothed apically, base not reaching the eye; cheeks moderately wide; gula and sides of the head flat, the former as wide as long, anterior margin arcuately concave, posterior margin incised; propodeum finely rugulose; abdomen elongate ovate, smooth and polished; wings subinfuscate; length 3 mms.

Described from four females (type and paratypes) collected in Kau, Hawaii, on the a-a flows, 3600-4000 ft. elev., by W. M. Giffard, July 13-27, 1918.

Type: Cat. No. 4, Bishop Museum.

5. *Sierola acuta* n.sp.

♀ shining black but not brilliant, antennæ basally, trochanters, tibiæ and tarsi brown.

Head and thorax to the propodeum with a microscopically fine, reticulate surface sculpture, finely, shallowly, closely and distinctly punctate and hairy. Head wider than the thorax, longer than wide, width between the eyes a little more than the length from eye to vertex, convex above, rather flat beneath, depth moderate and greatest directly behind the eye; vertical margin straight, temples rounded; eyes flatly convex; antennæ a little longer than the head, segments of the flagellum scarcely longer than wide, pedicel twice as long as wide, antennal fossæ deep; clypeal process spatulate, angulate in front, horizontally extended, exceeding the anterior margin of the head by half its length, medially longitudinally elevate and carinate; mandibles moderately large and stout, curved, concavo-convex, truncate apically and toothed, base not reaching the eye; cheeks rather narrow; gula and sides of the head flatly convex, the former wider than long, anterior margin arcuately, posterior margin semicircularly concave; propodeum rugulose, with a triangular area at its base smooth and shining; abdomen short ovate, smooth and polished; wings hyaline; length 2.25 mms.

Described from three females (type and paratypes). Type, Honolulu, Oahu, collected by P. H. Timberlake on window of H. S. P. A. Exp. Sta. building July 18, 1916. Paratypes collected by O. H. Swezey behind leaf-sheath of cane on the grounds of the H. S. P. A. Exp. Sta. March 27, 1908.

Type: Cat. No. 5, Bishop Museum.

6. *Sierola magna* n.sp.

♀ brilliant black, the legs and antennæ brown to fuscous.

Head and thorax with a microscopically fine reticulate surface sculpture, finely but only fairly closely punctate and hairy. Head wider than the thorax, longer than wide, width between the eyes a little more than the length from eye to vertex, convex above, a little tumid beneath, the greatest depth behind the eye; vertical margin straight, temples rounded, eyes convex; antennæ scarcely longer than the head, segments of the flagellum no longer than wide, except the pedicel and first three funicle segments, which are a little longer than wide, antennal fossæ deep; clypeal process a broad, flat, semicircular lamina, horizontally extended from the anterior margin of the head and strongly longitudinally carinate; mandibles stout, curved, concavo-convex, obliquely truncate and toothed apically, the base touching the eye above; gula convex, as wide as long, median groove nearly effaced; anterior margin slightly concave, posterior margin incised; propodeum finely aciculate; abdomen elongate ovate, smooth and polished; wings hyaline; length 3.25 mms.

Described from one female (type), collected in Niu Valley, Oahu, by O. H. Swezey, December 11, 1910.

Type: Cat. No. 6, Bishop Museum.

7. *Sierola kauensis* n.sp.

Plate XVI, Figure 2.

♀ shining black, legs and antennæ brown to fuscous.

Head and thorax to the propodeum with a microscopically fine surface sculpture, rather coarsely, shallowly and closely punctate and hairy. Head wider than the thorax, widest across the eyes, scarcely longer than wide, the length behind the eyes not great and the width decreasing slightly; convex above, tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, segments of the flagellum a little longer than wide, pedicel about twice as long as wide, antennal fossæ deep; clypeus hardly forming a beak; short, decurved, transverse, the anterior margin angulate, apex not greatly exceeding anterior margin of the head, medially longitudinally elevate and carinate; mandibles large, curved, concavo-convex, truncate and toothed apically, the base touching the eye above; gula and sides of the head flat, the former medially foreshortened, wider than long, strongly protuberant behind, and divided into two lobes by a rather deep median sulcus, posterior margin deeply incised, anterior margin almost straight; propodeum rugulose; abdomen moderately long ovate, smooth and polished; wings subinfuscate; length 3 mms.

Described from one female (type) collected at Kahuku, Kau, Hawaii, 2000 ft. elev., by W. M. Giffard, July 27, 1918.

Type: Cat. No. 7, Bishop Museum.

8. *Sierola notabilis* n.sp.

♀ shining black, head and thorax a little dull, legs, basal segments of antennæ and mandibles partly yellowish brown.

Body rather flat, head and thorax to the propodeum with a microscopically fine, reticulate surface sculpture, coarsely, fairly regularly but not closely punctate. Head longer than wide, width between the eyes a little more than the length from eye to vertex, convex above, tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ longer than the head, segments of the flagellum beyond the first funicle moniliform, pedicel and first funicle segment twice as long as wide, antennal fossæ deep; clypeal process a flat, transverse lamina, horizontally extended from the anterior margin of the head and longitudinally elevate and carinate; mandibles fairly stout, curved, concavo-convex, obliquely truncate and toothed apically, base touching the eye above; gula convex, medially foreshortened, wider than long, anterior margin arcuately concave, posterior margin incised; propodeum rugulose; abdomen ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 3.25 mms.

Described from three females (type and paratypes) collected at Kilauea, Hawaii, 4000 ft. elev., by W. M. Giffard. Type marked "No. 7," captured June 7, 1908. Paratypes marked "No. 4," taken in the dry forest, January 11, 1917.

Type: Cat. No. 8, Bishop Museum.

9. *Sierola sima* n.sp.

♀ black, head and thorax dull, abdomen shining, legs and antennæ brown to fuscous.

Head and thorax with a pronounced microscopic surface sculpture, scattered pin punctures and fine hairy clothing. Head wider than the thorax and longer than wide, width between the eyes more than the length from the eye to the vertex, convex above, a little tumid beneath, deepest directly behind the eyes; vertical margin slightly concave, temples rounded, eyes convex; antennæ longer than the head, segments of the flagellum beyond the second funicle moniliform, pedicel and first two funicle segments twice as long as wide, antennal fossæ deep; clypeal process a flat transverse lamina, horizontally extended from the anterior margin of the head and medially elevate and carinate; mandibles fairly stout, curved, concavo-convex, obliquely truncate and toothed apically, the base touching the eye above; gula convex, medially foreshortened, wider than long, anterior and posterior margins incised; propodeum rugulose; abdomen short ovate; wings subinfuscate; length 2.5 mms.

Described from two females (type and paratype) collected at Kilauea, Hawaii, 4000 ft. elev., by W. M. Giffard. Type taken at the lumber camp, July 19, 1918. Paratype marked "Box 4," and captured in May, 1910.

Type: Cat. No. 9, Bishop Museum.

10. *Sierola spicata* n.sp.

Plate XVI, Figure 3.

♀ with the head and thorax depressed and flat; shining black, the legs beyond the femora and the base of the antennæ brown.

Smooth and polished, the pronotum and propodeum with a more evident sculpture, and a little dull; finely, shallowly and fairly closely punctate and hairy. Head wider than the thorax, as wide as long, widest at the vertex and narrowing in front, width between the eyes scarcely more than the length from eye to vertex; vertical margin strongly concave, temples rounded, eyes flatly convex; antennæ a little longer than the head, segments of the flagellum scarcely longer than wide, pedicel twice as long as wide, antennal fossæ deep; clypeal process a spicate beak, horizontally extended from the anterior margin of the head, dorsally subcarinate, the surface smooth and flat, apex depressed; mandibles moderately large, curved, concavo-convex, truncate and toothed apically, base not reaching the eye; cheeks moderately wide; gula flat, medially very much foreshortened, anterior margin semicircularly concave, posterior margin deeply incised, median furrow nearly effaced; propodeum rugulose, a triangular area at the base smooth; abdomen short ovate, smooth and polished; wings subinfuscate with a faint yellowish brown pigmentation; length 3 mms.

♂ with the legs and antennæ basally yellowish brown, mandibles luteous, except at the base; head a little shorter, the sides parallel; clypeal process not spicate, and extending little beyond the anterior margin of the head; antennæ more slender; wings without pigmentation; abdomen bluntly pointed at the apex.

Described from one female and one male (type and allotype), collected on *Straussia kaduana*, on Lanihuli Ridge, Oahu, 1500 ft. elevation, by P. H. Timberlake, September 3, 1916.

Type: Cat. No. 10, Bishop Museum.

11. *Sierola spicata* subspecies *hawaiiensis* new subspecies.

♀ variable but generally wider between, shorter behind the eyes, with the surface sculpture more distinct and the punctuation of the head coarser than in the Oahu form.

Described from seven females (type and paratypes). Type collected at Kilauea, Hawaii, 4000 ft. elevation, by W. M. Giffard, July 6, 1918. Paratypes from Puuwaawaa, N. Kona, Hawaii, 3700-3800 ft. elev., Giffard, August, 1917.

Type: Cat. No. 11, Bishop Museum.

12. *Sierola nitida* n.sp.

♀ brilliant black, antennæ, tibiæ, and tarsi brown to fuscous.

Head and thorax with a delicate surface sculpture, uniformly closely and distinctly punctate and hairy. Head almost as wide as long, widest directly behind the eyes, narrowing behind and in front, width between the eyes a little more than the distance from the eye to the vertical margin; flat above, somewhat tumid beneath, deepest behind the eyes but without great depth; vertical margin slightly concave, temples rounded, eyes flat; antennæ scarcely longer than the head, all the segments beyond the pedicel as wide as or wider than long, the pedicel a little longer than wide, antennal fossæ fairly deep; clypeal process short and stout, bluntly spicate, convex above, extending little beyond the anterior margin of the head; mandibles long, slender, curved and toothed apically, base not quite reaching the eye; cheeks very narrow; gula and sides of the head flat, the former foreshortened, as wide as long; propodeum finely rugulose; abdomen elongate ovate, smooth and polished; wings hyaline; length 3 mms.

Described from one female (type), collected on Tantalus Mt., Oahu, 1500 ft. elevation, by W. M. Giffard, August 27, 1918.

Type: Cat. No. 12, Bishop Museum.

13. *Sierola bella* n.sp.

♀ slender, shining black, antennæ basally, pronotum and prosternum, except at the sides, and the legs yellowish brown, mandibles reddish apically.

Head and thorax with a microscopically fine surface sculpture, fairly closely, finely and shallowly punctate and hairy. Head as wide as long, width between the eyes considerably more than the length from eye to vertex, convex above, tumid beneath; vertical margin deeply concave, temples rounded, eyes convex; antennæ a little longer than the head, segments of the flagellum scarcely longer than wide, pedicel a little longer, antennal fossæ deep; clypeal process short and somewhat spicate; mandibles short, not very stout, curved, truncate and toothed apically, base not reaching the eye; cheeks moderately wide; gula flat, wider than long, divided into two lobes posteriorly by a short sulcus, median furrow nearly effaced, anterior margin arcuately concave, posterior margin deeply incised, sides of the head slightly convex; propodeum finely aciculate; abdomen elongate, smooth and polished; wings hyaline; length 3 mms.

Described from one female (type), collected in Palolo Crater, Oahu, by P. H. Timberlake, September 8, 1918.

Type: Cat. No. 13, Bishop Museum.

14. *Sierola gracilis* n.sp.

♀ slender, shining black, antennæ basally and the legs yellowish brown, antennæ apically and the femora outwardly infuscate, mandibles reddish brown medially and at the tips.

Head and thorax with a fine, reticulate surface sculpture, fairly closely, finely and shallowly punctate and hairy. Head considerably longer than wide, width between the eyes not much greater than the distance from the eye to the vertex; convex above and somewhat tumid beneath, deepest directly behind the eye; vertical margin very slightly concave, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, all the segments longer than wide, antennal fossæ deep; clypeus bluntly pointed, flat on top, apically depressed, extended a little beyond the anterior margin of the head; mandibles abruptly bent at the middle, rather slender basally, flattened and much wider distally, the apical margin obliquely truncate and toothed, base not quite reaching the eye; cheeks narrow; gula and sides of the head flat, the former medially foreshortened, as wide as long, median furrow very fine, anterior margin arcuately concave, posterior margin incised; abdomen elongate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.5 mms.

Described from one female (type) collected on Kaumuohona Ridge, Oahu, by P. H. Timberlake, January 7, 1917.

Type: Cat. No. 14, Bishop Museum.

15. *Sierola curvignatha* n.sp.

♀ dull black, antennæ basally, trochanters, fore-legs distally from the femora, middle and hind tibiæ at base and apex and tarsi entirely brown.

Head and thorax with a microscopically fine surface sculpture, rather closely, finely and shallowly punctate and hairy. Head considerably longer than wide, width between the eyes about equal to the length from the eye to the vertex; flatly convex above, depressed in front, tumid beneath, the greatest depth behind the eye; vertical margin straight, temples rounded, eyes flat; antennæ reaching the mesoscutum, all the segments of the flagellum longer than wide, pedicel twice as long as wide and funicle nearly so; clypeus spatulate, very little extended beyond the anterior margin of the head, convex apically, contracted basally by the inward extension of the antennal fossæ; mandibles large, bent in the middle, distal portion flattened, apical margin oblique and toothed, base not quite reaching the eye; cheeks narrow; gula and sides of the head flatly convex, the former medially foreshortened but longer than wide, median furrow very fine, anterior margin arcuately, posterior margin semicircularly concave; propodeum finely rugulose; abdomen short ovate, smooth and polished; wings subinfuscate; length 2.5 mms.

Described from one female (type) collected at Kilauea, Hawaii, at the lumber camp, 4000 ft. elevation, by W. M. Giffard, July 4, 1918.

Type: Cat. No. 15, Bishop Museum.

16. *Sierola emarginata* n.sp.

Plate XVI, Figure 4.

♀ shining black, legs and antennæ brown to fuscous.

Head and thorax to the propodeum with a microscopically fine surface sculpture, some scattered small shallow punctures on the mesonotum, the head a little more closely punctate and clothed with short, fine, whitish hairs. Head as wide as long, widest at the vertex, narrowing in front, width between the eyes greater than the length from eye to vertex; flatly convex above, depressed in front, tumid beneath, the greatest depth behind the eye; vertical margin deeply concave, temples rounded, eyes convex; antennæ longer than the head, segments of the flagellum scarcely longer than wide, pedicel longer by a half; clypeal process a small, decurved, spatulate beak, convex above, very little extended beyond the anterior margin of the head; mandibles not very stout, bent at the middle, truncate and toothed apically, base not reaching the eye; cheeks fairly wide; gula and sides of the head flat, the former medially foreshortened, wider than long, anterior margin arcuately concave, posterior margin incised; propodeum finely rugulose; abdomen elongate, smooth and polished; wings subinfuscate; length 2 mms.

Described from one female (type), collected on Hawaii by Albert Koebele. Date of capture not given.

Type: Cat. No. 16, Bishop Museum.

17. *Sierola giffardi* n.sp.

♀ shining black, the legs yellowish brown, infuscate to the apex of the femora, antennæ yellowish brown, fuscous outwardly, mandibles brown, fuscous basally.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, extremely finely, shallowly and fairly closely punctate, hairy clothing short and inconspicuous. Head nearly as wide as long, widest at the vertex, narrowing slightly in front, width between the eyes a little more than the length from the eye to the vertex; convex above, depressed in front, tumid beneath, the greatest depth behind the eyes; vertical margin concave, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments of the flagellum a little longer than wide, the pedicel hardly twice as long as wide, antennal fossæ deep; clypeal process a small, decurved, spatulate beak, flat above and extending more than half its length in front of the anterior margin of the head; mandibles not very stout; bent at the middle, the distal portion flattened, truncate and toothed apically, base not reaching the eye; cheeks fairly wide; gula and sides of the head flat, the former medially foreshortened, as wide as long, anterior margin arcuately concave, posterior margin incised; propodeum finely rugulose; abdomen elongate, smooth and polished; wings subinfuscate, with a more or less faint yellowish brown pigmentation; length 2.5 to 3 mms.

Described from two females (type and paratype) collected on Konahuanui, Oahu, by O. H. Swezey, February 22, 1914.

Type: Cat. No. 17, Bishop Museum.

18. *Sierola suttoniae* n.sp.

♀ black, hardly shining in front of the abdomen, head opaque, antennæ and legs brown.

Head and thorax to the propodeum with a microscopically fine surface sculpture, much coarser on the head, fairly coarsely, shallowly and remotely punctate, hairy clothing short and inconspicuous. Head a little longer than wide, width between the eyes a little more than the length from eye to vertex; flatly convex above, tumid beneath, the greatest depth beneath the posterior end of the eyes; vertical margin straight, temples rounded; eyes convex; antennæ reaching the mesoscutum, all the segments of the flagellum longer than wide, pedicel and funicle twice as long as wide, antennal fossæ deep; clypeus small, decurved, hardly exceeding the anterior margin of the head, contracted at the base by the inward extension of the antennal fossæ; mandibles stout, curved, concavo-convex, truncate and toothed apically, base nearly but not quite touching the eye above; cheeks narrow; gula and sides of the head convex, the former medially foreshortened, wider than long, anterior margin arcuately concave, posterior margin incised; propodeum rugulose; abdomen elongate ovate, smooth and polished; wings with a deep brown pigmentation; length 3 mms.

Described from one female (type), collected on *Suttonia lassertiana* on Mt. Kaala, Oahu, 2500 ft. elev., by P. H. Timberlake, March 4, 1917.

Type: Cat. No. 18, Bishop Museum.

19. *Sierola muiri* n.sp.

♀ shining black, antennæ and legs brown.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, a little coarser on the head and pronotum; finely and closely punctate and hairy. Head wider than the thorax, as wide as long, width between the eyes considerably more than the length from the eye to the vertex; convex above, depressed in front, tumid beneath, the greatest depth beneath the posterior end of the eyes; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments of the flagellum longer than wide, the pedicel and funicle twice as long as wide, antennal fossæ deep; clypeus spatulate, rather short, hardly exceeding the anterior margin of the head, convex above, apically depressed, contracted at the base by the inward extension of the antennal fossæ; mandibles fairly stout, bent at the middle, distal portion flattened, truncate apically and toothed, the base not reaching the eye; cheeks fairly wide; gula and sides of the head flat, the former medially foreshortened, wider than long, anterior margin arcuately concave, posterior margin incised; propodeum short, finely aciculate; abdomen elongate ovate, smooth and polished; wings subinfuscate, with a shallow yellowish brown pigmentation; length 3 mms.

Described from two females (type and paratype). Type collected at Kilauea, Hawaii, 4000 ft. elev., by Giffard and Muir, January 19, 1917. Paratype collected in the same locality by W. M. Giffard, June 8, 1908.

Type: Cat. No. 19, Bishop Museum.

20. *Sierola rocki* n.sp.

♀ shining black, the legs, mandibles and basal segments of antennæ yellowish brown, antennæ outwardly fuscous.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, finely, shallowly and remotely punctate, hairy clothing inconspicuous. Head a little wider than long, widest across the eyes, narrowing slightly behind and in front, width between the eyes twice the length from eye to vertex; convex above, depressed in front, tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments of the flagellum longer than wide, pedicel and funicle twice as long as wide, antennal fossæ deep; clypeus spatulate, rather small, horizontally extended, and exceeding the anterior margin of the head by half its length, convex above, contracted at base by the inward extension of the antennal fossæ; mandibles fairly stout, curved, concavo-convex, truncate apically and toothed, base touching eye above; gula and sides of the head flat, the former medially foreshortened, wider than long, anterior margin arcuately concave, posterior margin incised; propodeum rugulose; abdomen elongate ovate, smooth and polished; wings with a shallow yellowish brown pigmentation; length 2.25 mms.

Described from one female (type) collected near Kilauea, at 29 miles, from Hilo, on the Hilo-Kau road, Hawaii by D. T. Fullaway, May 12, 1913.

Type: Cat. No. 20, Bishop Museum.

21. *Sierola bicolor* n.sp.

♀ slender, shining black, almost brilliant, antennæ basally, prothorax and the legs luteous, mandibles testaceous.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, finely, shallowly and remotely punctate, hairy clothing short and inconspicuous. Head longer than wide, length from eye to vertex equalling the width between the eyes; convex above, depressed in front, tumid beneath, greatest depth behind the eyes, vertical margin straight, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, segments of the flagellum scarcely longer than wide, pedicel about twice as long as wide, antennal fossæ somewhat shallow; clypeus short, flat on top, apically depressed and blunt, hardly exceeding the anterior margin of the head, basally marked by converging lines from the sides; mandibles fairly stout, bent at the middle, distal portion flattened, truncate apically and toothed, base not reaching the eye; cheeks narrow; gula and sides of the head flat, the former medially foreshortened, longer than wide, narrowing behind, both anterior and posterior margin rather deeply incised; propodeum rugulose; abdomen somewhat particolored, elongate ovate, smooth and polished; wings subinfuscate; length 2.75 mms.

Described from two females (type and paratype). Type collected at Opaeula, Oahu, by D. T. Fullaway, March 30, 1913. Paratype collected on Mt. Kaala, Oahu, by P. H. Timberlake, July 22, 1917.

Type: Cat. No. 21, Bishop Museum.

22. *Sierola aristoteliae* n.sp.

♀ black, with the exception of the prothorax, which is yellowish brown, thorax only faintly shining, the head dull, opaque or nearly so; legs, apex of the clypeus, antennæ basally and the mandibles, except at the base, luteous, antennæ fuscous outwardly.

Thorax with a microscopically fine reticulate surface sculpture, head coarsely sculptured, apparently minutely granulate; very finely and closely punctate; clothed with a rather dense covering of short procumbent hairs. Head a little longer than wide, width between the eyes greater than the length from eye to vertex; length in front of the eyes not great; convex above, depressed in front, tumid beneath, the greatest depth in front of the posterior end of the eye; vertical margin straight, temples rounded; eyes convex, antennæ longer than the head, segments of the flagellum scarcely longer than wide, pedicel nearly twice as long as wide, antennal fossæ deep; clypeus short, projecting a litttle from the anterior margin of the head, longitudinally elevate in the middle and sloping at the sides, apex depressed, the carina distinct behind the antennæ but effaced in front of it; mandibles stout, curved, concavo-convex, truncate and toothed apically, base touching the eye above; gula and sides of the head convex, the former not much foreshortened medially, longer than wide, anterior margin arcuately concave, posterior margin incised; abdomen short ovate, smooth and polished; wings hyaline; length 2.5 mms.

Described from seven females (type and paratypes), four, including the type reared from the larvæ of a species of *Aristotelia* infesting a *Gouldia* fruit collected in Palolo by O. H. Swezey, January 11, 1914. Of the remaining paratypes, one was collected on Manoa Cliffs by P. H. Timberlake, March 29, 1918; one in the S. E. Koolau Mountains by J. C. Bridwell, September 9, 1917; and one along Cooke's trail, Nuuanu Valley, by D. T. Fullaway, January 14, 1917.

Type: Cat. No. 22, Bishop Museum.

23. *Sierola anthracina* n.sp.

♀ shining black, the antennæ basally and the legs yellowish brown, antennæ distally and the femora infuscate.

Head and thorax with a fine reticulate surface sculpture, finely, shallowly and fairly closely punctate and hairy. Head longer than wide, width between the eyes a little more than the length from the eye to the vertex; flatly convex above, depressed in front, tumid beneath, greatest depth behind the eye; vertical margin slightly concave, temples rounded but quite full, eyes flatly convex; antennæ reaching the mesoscutum, all the segments a little longer than wide, pedicel twice as long as wide, antennal fossæ deep; clypeus simple, flat on top, declivous at the sides, depressed apically, extended shortly in front of the anterior margin of the head as an acutely angulate projection, the base marked by converging lines from the sides, which meet in the middle and extend backward a short distance; mandibles fairly stout, bent near the middle, the distal portion twisted and flattened, obliquely truncate apically and toothed, base not touching the eye; cheeks narrow; gula and sides of the head flat, the former medially foreshortened, wider than long, anterior margin semicircularly concave, posterior margin deeply incised; propodeum finely rugulose; abdomen elongate ovate, smooth and polished; wings subinfuscate; length 3 mms.

Described from one female (type) collected on Tantalus Mountain, Oahu, 1500 ft. elevation, by W. M. Giffard, December 22, 1918.

Type: Cat. No. 23, Bishop Museum.

24. *Sierola konana* n.sp.

♀ shining black, legs and antennæ brown to fuscous.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, finely, shallowly and rather remotely punctate and hairy, the sculpture a little coarser on the propodeum. Head wider than the thorax, longer than wide, widest across the eyes, narrowing behind and in front, length in front almost as great as the length behind the eyes, width between considerably more than the length from eye to vertex but less than twice as much; flatly convex above, depressed in front, tumid beneath, deepest beneath the posterior end of the eye; vertical margin straight, temples rounded, eyes convex; antennæ almost reaching the mesoscutum, the segments of the flagellum all longer than wide, pedicel twice as long as wide, antennal fossæ deep; clypeus short, nearly horizontal, medially longitudinally elevate and sloping at the sides, extended a little in front of the anterior margin of the head; mandibles large, bent in the middle and twisted, the distal portion flattened, truncate apically and toothed, base not reaching the eye; cheeks narrow; gula and sides of the head rather flat, the former medially foreshortened, wider than long, narrowing a little and slightly protuberant behind, a shallow sulcus separating the two lobes; abdomen elongate ovate, smooth and polished; wings subinfuscate, with a very faint yellowish brown pigmentation; length 3 mms.

Described from one female (type) collected at Puuwaawaa, N. Kona, Hawaii, 3800 ft. elevation, by W. M. Giffard in August, 1917.

Type: Cat. No. 24, Bishop Museum.

25. *Sierola augustata* n.sp.

♀ moderately flat, slender, and shining black, antennæ basally, mandibles except at the base, trochanters, tibiæ and tarsi brown.

Head and thorax with a microscopically fine reticulate surface sculpture, a little coarser on the head and propodeum, almost impunctate, the minute pin punctures extremely fine, shallow and remote, hairy clothing inconspicuous. Head considerably longer than wide, the length from the eye to the vertex equalling the width between the eyes; flatly convex above, depressed in front, tumid beneath, the greatest depth behind the eye; vertical margin straight, temples rounded, eyes flatly convex; antennæ a little longer than the head, segments of the flagellum a little longer than wide, pedicel and first funicle segment twice as long as wide, antennal fossæ deep; clypeus short, flat on top, projected a little in front of the anterior margin of the head, apically depressed and bluntly pointed; mandibles slender, curved, toothed apically, base touching the eye above; gula and sides of the head flat, the former medially foreshortened, longer than wide, widening behind where it is divided into two lobes by a fairly deep median sulcus, anterior margin arcuately concave, posterior margin incised; abdomen elongate, smooth and polished; wings subinfuscate; length 2.25 mms.

Described from one female (type) collected at Kilauea, Hawaii, by W. M. Giffard in January, 1915.

Type: Cat. No. 25, Bishop Museum.

26. *Sierola levis* n.sp.

Plate XVI, Figure 5.

♀ moderately flat, slender, and shining, almost brilliant, black; legs, antennæ basally and mandibles, except at the base, luteo-testaceous.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; impunctate or nearly so, the minute pin punctures and hairs of extreme fineness. Head nearly twice as long as wide, widest at the vertex, narrowing in front, length from the eye to the vertex more than the width between the eyes; convex above, depressed in front, tumid beneath, greatest depth behind the eyes more than half the length; vertical margin very slightly concave, temples rounded, eyes rather flat; antennæ reaching the mesoscutum, all the segments of the flagellum considerably longer than wide, pedicel and first funicle segment twice as long as wide, antennal fossæ deep; clypeus short, projected a little in front of the anterior margin of the head, medially longitudinally elevate but without carina, apically depressed and bluntly pointed; mandibles long, slender, nearly straight, toothed apically, base touching the eye above, projecting slightly below; gula and sides of the head flat, the former medially foreshortened, twice as long as wide, somewhat protuberant behind and divided into two lobes by a deep median sulcus, anterior and posterior margins incised; propodeum rugulose, with a triangular area at the base smooth and shining; abdomen elongate ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 3 mms.

♂ with the head and abdomen shorter, the latter bluntly pointed apically, wings deeply pigmented.

Described from four females and five males (type, allotype and paratypes). Type and allotype collected on Tantalus mountain, Oahu, 1500 ft. elev., by W. M. Giffard, December 22, 1918; 2 ♂ ♂ and 1 ♀ collected on Manoa Ridge, Oahu, by D. T. Fullaway, February 13, 1917; 1 ♀ collected on Waialae Ridge, Oahu, by O. H. Swezey, April 22, 1917; 1 ♀ collected on Manoa Cliffs, Oahu, by P. H. Timberlake, September 1, 1918; 1 ♂ collected on Tantalus mountain, Oahu, 1500 ft. elev., by W. M. Giffard, August 27, 1918; 1 ♂ collected on Manoa Cliffs, Oahu, by P. H. Timberlake, March 29, 1918, paratypes.

Type: Cat. No. 26, Bishop Museum.

27. *Sierola brevicornis* n.sp.

♀ moderately flat, slender, and shining, almost brilliant, black; legs and antennæ basally luteo-testaceous, the latter fuscous outwardly, mandibles reddish brown except at the base.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, coarsely, shallowly and remotely punctate and hairy. Head a little longer than wide, width between the eyes more than the length from eye to vertex; flat above, depressed a little in front, and a little tumid beneath, the greatest depth behind the eye; vertical margin straight, temples rounded, eyes convex, antennæ a little longer than the head, all the segments of the flagellum as wide as long with the exception of the pedicel, which is a little longer, antennal fossæ deep; clypeus short, medially longitudinally elevate, sloping at the sides, depressed apically and slightly projected in front of the anterior margin of the head; mandibles slender, curved, concavo-convex, truncate apically and toothed, base not reaching the eye; cheeks very narrow; gula and sides of the head flat, the former medially foreshortened, wider than long, anterior margin arcuately curved, posterior margin incised; propodeum hardly rugulose, a little more coarsely sculptured than the head and thorax in front; abdomen elongate ovate, smooth and polished; wings subinfuscate; length 2.75 mms.

Described from one female (type) collected at Kaumuohona, Oahu, by P. H. Timberlake, June 4, 1916.

Type: Cat. No. 27, Bishop Museum.

28. *Sierola montana* n.sp.

♀ brilliant black, legs and antennæ basally luteo-testaceous, the latter fuscous outwardly; mandibles testaceous.

Head and thorax with a microscopically fine and delicate reticulate surface sculpture; finely, shallowly and somewhat remotely punctate, hairy clothing short and inconspicuous. Head as wide as long, widest across the eyes, which are slightly bulging, short behind the eyes, width between the eyes twice the length from eye to vertex; convex above, depressed in front, tumid beneath, the greatest depth, beneath the posterior end of the eye, at least two-thirds the length; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments of the flagellum longer than wide, the pedicel more than twice as long as wide, antennal fossæ deep; clypeus short, medially longitudinally elevate and sloping at the sides, depressed apically and slightly projected in front of the anterior margin of the head; mandibles slender, curved, concavo-convex, toothed apically, base nearly reaching the eye above; gula and sides of the head flat, the former medially foreshortened, considerably wider than long and somewhat protuberant behind where it is divided into two lobes by a wide and shallow sulcus; propodeum rugulose, flat on top, declivous behind and at the sides, the margins distinct; abdomen elongate ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.5 mms.

Described from one female (type) collected on Kaala mountain, Oahu, 2500-3000 feet elevation, by P. H. Timberlake, July 22, 1917.

Type: Cat. No. 28, Bishop Museum.

29. *Sierola peleana* n.sp.

♀ shining black, almost brilliant, legs and antennal scape flavous, the flagellum fuscous; mandibles reddish brown.

Head and thorax with a microscopically fine reticulate surface sculpture; finely, shallowly, and remotely punctate; sparingly clothed with short stiff white hairs. Head a little longer than wide, width between the eyes more than the length from the eye to the vertex; flatly convex above, depressed in front, tumid beneath, greatest depth beneath the posterior end of the eye; vertical margin straight, temples rounded, eyes convex, antennæ reaching the mesoscutum, all the segments considerably longer than wide, the pedicel and first funicle segment twice as long as wide, antennal fossæ deep; clypeus short, medially elevate and sloping at the sides, depressed apically and slightly projected in front of the anterior margin of the head; mandibles stout, bent in the middle, the distal portion twisted and flattened, truncate apically and toothed, base touching the eye above; gula and sides of the head flatly convex, the former medially foreshortened, as wide as long, anterior margin arcuately concave, posterior margin incised; propodeum rugulose; abdomen ovate, smooth and polished; wings subinfuscate; length 3 mms.

Described from three females (type and paratypes). Type collected on Kaala mountain, Oahu, 2000 ft. elev., on *Pelea clusiaefolia*, by P. H. Timberlake, March 4, 1917. Two specimens collected on Niu Ridge, Oahu, by P. H. Timberlake, February 10, 1918, paratypes.

Type: Cat. No. 29, Bishop Museum.

30. *Sierola kaala* n.sp.

♀ moderately flat and elongate; dull black on the head, thorax a little more shining, abdomen brilliant; antennæ and legs brown to fuscous, antennæ fuscous outwardly, legs basally from the apex of the femora.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, a little coarser on the head than on the thorax;

fairly closely, shallowly and a little coarsely punctate and hairy. Head longer than wide by the length in front of the eyes, width between the eyes considerably more than the length from eye to vertex; flatly convex above, depressed in front, tumid beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, all the segments longer than wide, pedicel nearly twice as long as wide, antennal fossæ deep; clypeus reduced by erosion to a carinate ridge, declivous at the sides, apically depressed and slightly projected in front of the anterior margin of the head; mandibles stout, curved, concavo-convex, truncate apically and toothed, base reaching the eye above; gula and sides of the head flatly convex, the former medially foreshortened, a little longer than wide, slightly protuberant behind where it is divided into two lobes by a wide, shallow sulcus, anterior margin almost straight, posterior margin incised; propodeum finely rugulose; abdomen elongate ovate; wings with a yellowish brown pigmentation; length 3.5 mms.

Described from one female (type) collected on Kaala mountain, Oahu, 2500-3000 ft. elevation, by P. H. Timberlake, July 22, 1917.

Type: Cat. No. 30, Bishop Museum.

31. *Sierola usitata* n.sp.

♀ moderately flat, slender and elongate; head and thorax dull black, abdomen brilliant, antennæ and legs brown to fuscous, the former fuscous outwardly, the latter basally.

Head and thorax to the propodeum with a microscopically close, rather coarse, reticulate surface sculpture, a little coarsely, shallowly and closely punctate, clothed with silvery white hairs. Head considerably longer than wide, width between the eyes not much greater than the distance from the eye to the vertex; convex above, depressed in front and a little tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin straight, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, all the segments longer than wide, pedicel twice as long as wide, antennal fossæ deep; clypeus carinate, slightly projected in front of the anterior margin of the head, depressed in front and sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles fairly stout, curved, concavo-convex, truncate and toothed apically, base touching the eye above; gula and sides of the head flat, the former medially foreshortened, longer than wide, narrowing posteriorly, anterior margin straight, posterior margin incised; the latter with a highly polished surface; propodeum finely rugulose; abdomen elliptical, apically acuminate, smooth and polished; wings with a deep yellowish brown pigmentation; length 3.1 mms.

♂ smaller, head shorter, antennæ more slender, mandibles luteo-testaceous; abdomen bluntly pointed at the apex.

Described from five females and one male (type, allotype and paratypes) collected at Kaumuohona, Oahu, by P. H. Timberlake, September 9, 1917.

Type: Cat. No. 31, Bishop Museum.

32. *Sierola carinata* n.sp.

♀ unusually large; shining black, not brilliant, tibiæ and tarsi fuscous. Head and thorax with a microscopically close and fairly coarse reticulate surface sculpture, fairly closely but somewhat irregularly punctate and hairy. Head wider than the thorax and considerably longer than wide, widest at the vertex and narrowing slightly in front, width between the eyes greater than the distance from the eye to the vertex, which is considerable; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ longer than the head, segments of the flagellum as wide as or wider than long, pedicel a little longer than wide, antennal fossæ deep; clypeus reduced by erosion at the sides to a carinate ridge, depressed apically and projecting a little in front of the anterior margin of the head, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles very stout, curved, concavo-convex, truncate apically and toothed, base nearly reaching the eye above; gula rather flat and hairy, somewhat foreshortened medially, a little wider than long, anterior margin almost straight, posterior margin incised; abdomen elongate ovate, smooth and polished, somewhat depressed; wings subinfuscate, with a rather faint yellowish-brown pigmentation basally and along costal border; length 3.5 mms.

Described from one female (type) collected at Kilauea, Hawaii, lumber camp, 4000 ft. elevation, by W. M. Giffard, July 4, 1918.

Type: Cat. No. 32, Bishop Museum.

33. *Sierola koa* n.sp.

♀ unusually large; shining black, legs and antennæ yellowish brown, the latter fuscous outwardly.

Head and thorax with a microscopically fine reticulate surface sculpture, finely and closely punctate and hairy. Head considerably longer than wide, widest across the eyes, slightly narrower behind and in front, length from the eye to the vertex equalling the width between the eyes; flatly convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ scarcely longer than the head, the segments of the flagellum not much longer than wide, pedicel a little longer, antennal fossæ deep; clypeus short, carinate, apically depressed and projecting a little in front of the anterior margin of the head, sloping at the sides; mandibles very stout, bent at the middle, distal portion somewhat flattened, obliquely truncate apically and toothed, base touching the eye above; gula and sides of the head convex, the former medially foreshortened, wider than long, finely punctate and hairy, anterior margin nearly straight, posterior margin incised; abdomen ovate, apically acuminate, smooth and polished; wings hyaline; length 3.25 mms.

Described from three females (type and paratypes) collected on Tantalus mountain, Oahu, on *Acacia koa*, by J. C. Bridwell, June, 1918.

Type: Cat. No. 33, Bishop Museum.

34. *Sierola pilosa* n.sp.

Plate XVI, Figure 6.

♀ unusually large and thick-set; dull shining black, antennæ and legs brown, the fore-femora outwardly and the antennæ distally fuscous.

Head and thorax to the propodeum with a microscopically close and rather coarse reticulate surface sculpture, uniformly closely and shallowly punctate and clothed with long light brown to silvery hairs. Head considerably longer than wide, widest across the eyes, much narrower behind and in front, width between the eyes a little more than the length from the eye to the vertex, which is considerable; flatly convex above, depressed in front, very tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ longer than the head, all the segments considerably longer than wide, antennal fossæ deep; clypeus reduced to an extremely thin, carinate ridge, vertically depressed apically and projecting a little in front of the anterior margin of the head, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, apically toothed, base not reaching the eye; cheeks narrow; gula and sides of the head flat, the former medially foreshortened, as wide as long in front, narrowing behind where it is strongly protuberant and divided into two lobes by a deep sulcus; anterior margin almost straight; propodeum rugulose; abdomen elongate ovate, mostly smooth and polished, but an extremely fine reticulate surface sculpture evident; wings subinfuscate, with a faint yellowish-brown pigmentation; length 3.5 mms.

Described from five females (type and paratypes), collected at Kualapuu, Molokai, by D. T. Fullaway, July 15, 1910.

Type: Cat. No. 34, Bishop Museum.

35. *Sierola megalognatha* n.sp.

♀ moderately flat and unusually large; shining black, legs and antennæ brown to fuscous.

Head and thorax with a microscopically fine reticulate surface sculpture, closely and shallowly punctate and hairy. Head nearly as wide as long, widest at the vertex, narrowing a little in front, width between the eyes nearly twice the length from eye to vertex; flat on top, depressed in front, a little tumid beneath; deepest behind the eyes, the greatest depth less than half the length; vertical margin straight, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, segments of the flagellum a little longer than wide, the pedicel nearly twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting a little in front of the anterior margin of the head, sloping at the sides; mandibles abnormally large, bent at the middle, the distal portion flattened and punctate, apically truncate and toothed, base reaching the eye above; gula and sides of the head flat, the former scarcely as long as wide but not much foreshortened medially, posterior margin incised, anterior margin arcuately concave; abdomen ovate, apically acuminate, smooth and polished; wings hyaline; length 3.5 mms.

♂ smaller; mandibles yellowish brown, abdomen bluntly pointed at the apex.

Described from two females and one male (type, allotype and paratype), collected at Puuwaawaa, N. Kona, Hawaii, 3700 ft. elevation, by W. M. Giffard, August, 1917.

Type: Cat. No. 35, Bishop Museum.

36. *Sierola tantalea* n.sp.

♀ unusually large; shining black, antennæ, legs and posterior margin of the abdominal segments brown, the antennæ fuscous outwardly.

Head and thorax with a microscopically fine reticulate surface sculpture, rather closely and finely punctate and hairy. Head wider than the thorax, a little longer than wide, the length from eye to vertex about equalling the width between the eyes, length in front of the eyes not great; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ no longer than the head, pedicel a little longer than wide, following segments as wide as or even wider than long, antennal fossæ deep; clypeus reduced by erosion from the sides to a longitudinal, carinate ridge, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula convex, medially foreshortened, wider than long, anterior margin arcuately concave, posterior margin incised, median groove nearly effaced; abdomen elongate ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 3.5 mms.

Described from three females (type and paratypes) collected on Tantalus mountain, Oahu, 1300-1800 ft. elevation. Type, numbered 284, collected by W. M. Giffard, September 9, 1908. One specimen, collected by W. M. Giffard, September 14, 1907, and one labelled Oahu (Koebele), paratypes.

Type: Cat. No. 36, Bishop Museum.

37. *Sierola compacta* n.sp.

♀ moderately large and thick-set; shining black, the head a little dull, antennæ brown to fuscous at the base; trochanters, femora apically, tibiæ and tarsi testaceous.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, a little coarser on the head than on the thorax, rather closely, coarsely and shallowly punctate, and hairy. Head nearly as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes twice the length from eye to vertex; convex above, depressed in front, tumid beneath, deepest under the eye; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, the segments of the flagellum all longer than wide, the pedicel twice, the funicle three times as long as wide; antennal fossæ deep; clypeus carinate, apically depressed and projecting a little in front of the anterior margin of the head, sloping at the sides; mandibles slender, curved, toothed apically, base not reaching the eye; cheeks narrow; gula and sides of the head convex, the former medially foreshortened, transverse, anterior margin arcuately concave, posterior margin incised, median groove nearly effaced; propodeum rugulose, opaque; abdomen short ovate, smooth and polished; wings subinfuscate, with a yellowish brown pigmentation; length 3 mms.

Described from two females (type and paratype). Type collected on a-a flow, Kau, Hawaii, 3600 ft. elevation, by W. M. Giffard, July 18, 1918. One specimen from Kilauea, Hawaii, collected by W. M. Giffard, June 12, 1908, and numbered 13, paratype.

Type: Cat. No. 37, Bishop Museum.

38. *Sierola osborni* n.sp.

♀ unusually large; shining black, almost brilliant, antennæ and legs fuscous to black, the middle and hind femora entirely black.

Head and thorax with a microscopically fine reticulate surface sculpture, fairly closely, shallowly and rather coarsely punctate and hairy. Head wider than the thorax, a little longer than wide, width between the eyes greater than the length from eye to vertex; convex above and beneath, without great depth; vertical margin straight, temples rounded, eyes convex; antennæ longer than the head, all the segments a little longer than wide, the pedicel more than twice as long as wide, antennal fossæ deep; clypeus reduced by erosion from the sides to a carinate ridge, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the head beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate apically and toothed, base reaching the eye above; gula and sides of the head convex, the former very much foreshortened medially, transverse, anterior margin arcuately, posterior margin semicircularly concave, median groove faintly impressed; abdomen ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation basally; length 3.5 mms.

Described from one female (type) collected at Kilauea, Hawaii, by D. T. Fullaway, May 12, 1913.

Type: Cat. No. 38, Bishop Museum.

39. *Sierola fuscipennis* n.sp.

♀ unusually large; dull black, the head opaque, antennæ and legs brown, the former fuscous outwardly, the latter with the coxæ and femora mostly black.

Head and thorax with a microscopically fine and close reticulate surface sculpture, closely and finely punctate and hairy. Head a little longer than wide, widest across the eyes, narrowing slightly behind and in front, width between the eyes considerably more than the length from eye to vertex; convex above, depressed in front, a little tumid beneath; vertical margin slightly convex, temples rounded, eyes convex; antennæ a little longer than the head, all the segments longer than wide, antennal fossæ deep; clypeus reduced by erosion from the sides to a carinate ridge, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate apically and toothed, base nearly reaching the eye above; cheeks very narrow; gula and sides of the head flatly convex, the former medially foreshortened, transverse, anterior margin arcuately concave, posterior margin incised; abdomen elongate ovate, smooth and polished; wings with a slightly fuscous pigmentation; length 4 mms.

Described from one female (type) collected on the Shipman Ranch, at Kilauea, Hawaii, by F. Muir, January 14, 1917.

Type: Cat. No. 30, Bishop Museum.

40. *Sierola longicaudata* n.sp.

♀ unusually large and thick-set; black, the head and thorax dull, the former nearly opaque, legs and antennæ brown to fuscous.

Head and thorax with a microscopically fine and close reticulate surface sculpture, finely, shallowly and rather closely punctate and hairy. Head a little longer than wide, widest across the posterior part of the eyes, narrowing behind and in front, smallest width, between the eyes, twice the length from eye to vertex; convex above and beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, antennal fossæ deep; clypeus carinate and vertically depressed, projecting a little in front of the anterior margin of the head, declivous at the sides; mandibles fairly stout, curved, concavo-convex, truncate and toothed apically, base not quite reaching the eye; cheeks narrow; gula and sides of the head flat, the former medially foreshortened, wider than long, anterior and posterior margins arcuately concave, median groove nearly effaced; abdomen elongate ovate, apically acuminate; wings hyaline or nearly so; length 3.75 mms.

Described from three females (type and paratypes) collected on Maui by Koebele.

Type: Cat. No. 40, Bishop Museum.

41. *Sierola laticeps* n.sp.

♀ unusually large; dull shining black, antennæ and legs brown, the fore-coxæ and femora outwardly fuscous.

Head and thorax to the propodeum with a microscopically fine and close reticulate surface sculpture, closely and shallowly punctate and thinly clothed with silvery gray hairs. Head wider than the thorax, a little longer than wide, widest across the eyes, narrowing behind and in front, width between the eyes considerably more than the length from eye to vertex; convex above, depressed in front, abnormally swollen beneath, the greatest depth, beneath the posterior end of the eye, at least two-thirds the length; vertical margin straight, temples rounded, eyes convex; antennæ longer than the head, all the segments considerably longer than wide, antennal fossæ deep; clypeus reduced by erosion from the sides to a thin, carinate ridge, apically depressed and projecting slightly in front of the anterior margin of the head, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles short, stout, concavo-convex, truncate and toothed apically, base not reaching the eye; cheeks narrow; gula and sides of the head flatly concave, the former medially foreshortened, about as long as wide, narrowing behind where it is strongly protuberant and divided into two lobes by a rather deep median sulcus; propodeum finely rugulose;

abdomen elongate ovate, smooth and polished; wings with a faint yellowish brown pigmentation; length 3.75 mms.

Described from seventeen females (type and paratypes). Type collected at Hilo, Hawaii, 1500 ft. elevation, by W. M. Giffard, August 3, 1906. Five ♀♀ from the Kilauea koa forest, collected by F. W. Terry, May 24, June 3, 1905; 6 ♀♀ labelled Hawaii (Koebele); 1 ♀ from the Kilauea koa forest collected by W. M. Giffard, July 19th, 1911; 1 ♀ from Kau road, collected by Giffard and Muir, January 16, 1917; 1 ♀ from the Kilauea dry forest, 4000 ft. elevation, collected by W. M. Giffard, January 9, 1919; 1 ♀ from Puuwaawaa, N. Kona, 3700 ft. elevation, collected by W. M. Giffard, August, 1917; 1 ♀ from Kahuku, Kau, collected by Giffard and Muir, January 15, 1917, paratypes.

Type: Cat. No. 41, Bishop Museum.

42. *Sierola localis* n.sp.

♀ unusually large; dull shining black, trochanters, tibiæ and tarsi and a large part of the antennæ brown.

Head and thorax to the propodeum with a microscopically fine and close reticulate surface sculpture, fairly closely and finely punctate and hairy, the pin punctures on the head extremely fine. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes twice the length from eye to vertex; flatly convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments considerably longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides; mandibles fairly stout, curved, concavo-convex, truncate and toothed apically, base reaching the eye above; gula flatly convex, medially foreshortened, wider than long, anterior margin nearly straight; propodeum rugulose; abdomen elongate ovate, smooth and shining; wings subinfuscate; length 3.5 mms.

Described from one female (type) collected on Tantalus mountain, Oahu, 1300 ft. elevation, by W. M. Giffard, January 15, 1905.

Type: Cat. No. 42, Bishop Museum.

43. *Sierola obscura* n.sp.

♀ unusually large and thick-set; dull shining black, the head nearly opaque; trochanters, tibiæ and tarsi brown, antennæ brown to fuscous.

Head and thorax with a microscopically fine reticulate surface sculpture, coarsely, shallowly and fairly closely punctate and hairy, both sculpture and punctuation coarser on the head than on the thorax. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes twice the length from eye to vertex; convex above, depressed in front, tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments considerably longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate and toothed apically, base reaching the eye above; gula convex, medially foreshortened, twice as wide as long, slightly depressed behind on either side of the median groove, anterior margin nearly straight, posterior margin incised; abdomen elliptic-ovate, apically acuminate, smooth and polished; wings hyaline; length 3.5 mms.

Described from one female (type) collected at Palolo, Oahu, by O. H. Swezey, January 3, 1915.

Type: Cat. No. 43, Bishop Museum.

44. *Sierola levigata* n.sp.

♀ unusually large; shining black, the head and thorax very dull, trochanters, tibiæ, tarsi and apex of the mandibles brown, antennæ fuscous.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, coarsely, shallowly and closely punctate and hairy. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes twice the length from eye to vertex, length in front of the eyes not great; convex above and beneath, vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments considerably longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles short, stout, curved, concavo-convex, truncate and toothed apically, base nearly reaching the eye above; cheeks extremely narrow; gula and sides of the head convex, the former medially foreshortened, twice as wide as long, slightly depressed behind on either side of the median line, anterior margin arcuately concave, posterior margin incised; propodeum finely rugulose; abdomen elongate ovate, smooth and polished; wings subinfuscate; length 3.75 mms.

Described from one female (type) collected at Kilauea, Hawaii, 4000 ft. elevation, by W. M. Giffard, October, 1915.

Type: Cat. No. 44, Bishop Museum.

45. *Sierola tenuis* n.sp.

♀ slender; shining black, the legs and antennæ basally yellowish brown, the latter fuscous outwardly, mandibles brown except at the base.

Head and thorax with a microscopically fine reticulate surface sculpture, fairly coarse except on the propodeum; closely, shallowly and somewhat coarsely punctate, rather thickly clothed with long silvery-gray hairs. Head twice as long as wide, width between the eyes a little less than the length from eye to vertex; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ a little longer than the head, pedicel longer than wide, following segments as wide as long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, declivous at the sides; mandibles fairly stout, curved, truncate and toothed apically, base touching the eye above; gula and sides of the head flat, the former convex behind, medially foreshortened but considerably longer than wide, narrowing posteriorly, anterior margin nearly straight, posterior margin incised; abdomen short ovate, smooth and polished; wings subinfuscate; length 2.5 mms.

Described from one female (type) collected at Palolo, Oahu, by O. H. Swezey, January 3, 1915.

Type: Cat. No. 45, Bishop Museum.

46. *Sierola depressella* n.sp.

♀ slender; shining black, antennæ and legs fuscous.

Head and thorax with a microscopically fine reticulate surface sculpture and extremely finely and remotely punctate, hairy clothing inconspicuous. Head twice as long as wide, width between the eyes a little less than the length from eye to vertex; nearly flat above and beneath; vertical margin straight, temples rounded, eyes flat; antennæ a little longer than the head, pedicel longer than wide, following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed and slightly projecting in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate and toothed apically, base touching the eye above; gula flatly convex, not much foreshortened medially, considerably longer than wide, anterior margin arcuately concave, posterior margin incised; abdomen elongate ovate, smooth and polished, a faint reticulate surface sculpture on the tergites; wings subinfuscate; length 2 mms.

Described from one female (type) collected on Kaala mountain, Oahu, 2500-3000 ft. elevation, by P. H. Timberlake, July 22, 1917.

Type: Cat. No. 46, Bishop Museum.

47. *Sierola glabra* n.sp.

♀ slender, somewhat depressed; shining black, almost brilliant, trochanters, tibiæ, tarsi and antennæ brown, the latter fuscous outwardly.

Head and thorax with a microscopically fine reticulate surface sculpture, finely, shallowly and somewhat remotely punctate, hairy clothing inconspicuous. Head somewhat longer than wide, width between the eyes equalling the distance from eye to vertex, length in front of the eyes not great; convex above and beneath, depressed in front; vertical margin straight, temples rounded, eyes flatly convex; antennæ hardly longer than the head, pedicel longer than wide, following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides; mandibles slender, curved, truncate and toothed apically, base touching the eye above; gula and sides of the head flat, the former medially foreshortened, as wide as long, a little convex behind, anterior margin arcuately concave, posterior margin incised; abdomen elongate ovate, smooth and polished; wings subinfuscate; length 2.25 mms.

Described from one female (type) collected on Tantalus mountain, Oahu, 1300 ft. elevation, by W. M. Giffard, May 7, 1911.

Type: Cat. No. 47, Bishop Museum.

48. *Sierola flavicornis* n.sp.

♀ shining black, almost brilliant, antennæ and legs flavous .

Head and thorax with a microscopically fine reticulate, surface sculpture, finely, shallowly and somewhat remotely punctate, hairy clothing inconspicuous. Head considerably longer than wide, width between the eyes equalling the distance from eye to vertex, length in front of the eyes not great; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ hardly longer than the head, pedicel a little longer than wide, following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed and slightly projecting in front of the anterior margin of the head, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate and toothed apically, base touching the eye above; gula flatly convex, medially foreshortened, as wide as long, anterior margin arcuately concave, posterior margin incised; abdomen elongate ovate, smooth and shining; wings hyaline; length 2.25 mms.

Described from one female (type) collected on Tantalus mountain, Oahu, elevation 1300 ft., by W. M. Giffard, January 1, 1905.

Type: Cat. No. 48, Bishop Museum.

49. *Sierola timberlakei* n.sp.

♀ shining yellowish brown, often infuscate, legs, antennæ and mandibles concolorous.

Head and thorax with a microscopically fine reticulate surface sculpture, finely, shallowly and fairly closely punctate and hairy. Head a little longer than wide, widest across the eyes, narrowing behind and in front, width between the eyes considerably more than the length from eye to vertex; flatly convex above, depressed in front, a little tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, segments of the flagellum longer than wide, the pedicel nearly twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides; mandibles slender, curved, apically truncate and toothed, base reaching the eye above; gula and sides of the head flat, the former medially foreshortened, as wide as long, narrowing behind where it is rather convex, anterior margin arcuately concave, posterior margin incised; abdomen ovate, smooth and shining; wings subinfuscate with a faint yellowish brown pigmentation; length 2 mms.

♂ a little smaller, the head as wide as long, abdomen bluntly pointed at the apex.

Described from eight females and one male (type, allotype and paratypes). Type from Tantalus mountain, Oahu, mounted on pin with one other lacking head, both of which were specimens reared from larvæ of *Batrachedra sophroniella*, by O. H. Swezey. August 13. 1911. One ♂ collected at Waiawa, Oahu, by O. H. Swezey, May 4, 1913, allotype. Two ♀♀ collected at Kalihi, Oahu, by O. H. Swezey, May 7, 1914, one ♀ collected on

Tantalus mountain, Oahu, by O. H. Swezey, August 4, 1912, one ♀ collected on Cooke's Trail, Nuuanu Valley, Oahu, by P. H. Timberlake, on *Cyrtandra grandiflora,* March 19, 1916, one ♀ collected on Kaala mountain, Oahu, 2000 ft. elevation, by P. H. Timberlake, March 4, 1917, one ♀ collected in Nuuanu, Oahu, by D. T. Fullaway, August 20, 1916, paratypes.

Type: Cat. No. 49, Bishop Museum.

50. *Sierola pulchra* n.sp.

♀ shining, almost brilliant, black on the head, shining yellowish brown on the thorax and abdomen, often infuscate, legs and antennæ luteous, the latter fuscous outwardly, mandibles brown except at the base.

Head and thorax with a microscopically fine reticulate surface sculpture, finely, shallowly and remotely punctate, hairy clothing inconspicuous. Head a little longer than wide, widest across the eyes, narrowing behind and in front, width between the eyes equalling the length from eye to vertex; flat above, convex beneath, deepest behind the eye but without great depth; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, the segments of the flagellum longer than wide, pedicel twice as long as wide, antennal fossæ deep; clypeus carinate, depressed apically and projecting slightly in front of the anterior margin of the head, sloping at the sides; mandibles slender, curved, flattened distally, apically truncate and toothed, base touching the eye above; gula and sides of the head flat, the former medially foreshortened, as long as wide, anterior margin arcuately concave, posterior margin incised, median groove very fine; abdomen ovate, smooth and polished; wings subinfuscate, sometimes with a faint yellowish brown pigmentation; length 2.5 mms.

♂ a little smaller, mandibles luteous, abdomen bluntly pointed at the apex.

Described from 21 females and 5 males (type, allotype and paratypes). Type and allotype from Tantalus mountain, Oahu, and part of a series including 10 ♀♀ and 4 ♂♂ specimens, reared by O. H. Swezey from leaf-miner in *Urera,* March 15, 1914. In addition to the paratypes in the above series, there are four females and one male from Manoa Cliffs, Oahu, reared by P. H. Timberlake, from *Urera* leaf miner, April 15, 1918; 4 ♀♀ from Manoa Cliffs, Oahu, collected by P. H. Timberlake on *Urera sandwicensis,* March 29, 1918; 1 ♀ from Tantalus, reared by O. H. Swezey, from blotch miner in *Urera,* August 29, 1915; 1 ♀ collected on Tantalus by O. H. Swezey, March 16, 1915; 1 ♀ collected in Nuuanu, by D. T. Fullaway, March 4, 1912, paratypes.

Type: Cat. No. 50, Bishop Museum.

51. *Sierola pubescens* n.sp.

♀ shining black, abdominal segments posteriorly margined with brown, legs yellowish brown, antennæ yellowish brown, fuscous outwardly.

Head and thorax with a microscopically fine reticulate surface sculpture, coarsely and fairly closely punctate and hairy. Head wider than the thorax and a little longer than wide, length from the eye to the vertex equalling the width between the eyes, length in front of the eyes not great;

convex above, depressed in front, a little tumid beneath, the greatest depth behind the eye; vertical margin straight, temples rounded, eyes flatly convex; antennæ scarcely longer than the head, pedicel a little longer than wide, following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate apically and toothed, base nearly or quite reaching the eye; gula convex, closely punctate and pubescent, medially foreshortened, wider than long, the median groove distinct, anterior margin arcuately concave, posterior margin incised; abdomen ovate, smooth and polished; wings subinfuscate, with a very faint yellowish brown pigmentation; length 3 mms.

Described from 9 females (type and paratypes), collected on Tantalus mountain, Oahu, 1300 ft. elevation, by W. M. Giffard. Two specimens, one of which is the type, collected October 15, 1905. In addition to the paratype just mentioned, there are three specimens, collected November 14, 1907, 2 specimens collected April 16, 1905, 1 specimen collected March 11, 1905, 1 specimen collected December 2, 1905, paratypes,

Type: Cat. No. 51, Bishop Museum.

52. *Sierola seminigra* n.sp.

♀ black, with the exception of the prothorax, which is brown; and shining, with the exception of the head, which is dull, opaque or nearly so; legs, antennæ and mandibles brown.

Head and thorax with a microscopically fine reticulate surface sculpture, coarser and closer on the head; very finely, closely and shallowly punctate; hairy clothing short and inconspicuous. Head a little longer than wide, width between the eyes a little more than the length from eye to vertex, length in front of the eyes not great; convex above, a little tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin straight, temples rounded, eyes flatly convex; antennæ a little longer than the head, pedicel a little longer than wide, following segments as wide as long or nearly so, antennal fossæ deep; clypeus short, carinate, apically depressed and projecting slightly in front of the anterior margin of the head, declivous at the sides, the carina extending backward a little on the top of the head; mandibles fairly stout, curved, concavo-convex, truncate apically and toothed, base not quite reaching the eye; gula convex, medially foreshortened, wider than long, anterior margin almost straight, posterior margin deeply incised; abdomen ovate, apically acuminate, smooth and polished; wings with a yellowish brown pigmentation; length 2.75 mms.

♂ smaller, head shorter, legs, antennæ and mandibles paler, abdomen bluntly pointed at the apex, wings nearly hyaline.

Described from four females and one male (type, allotype and paratypes). Type collected on Cooke's Trail, Nuuanu Valley, Oahu, by D. T. Fullaway, January 14, 1917. One ♂ and one ♀ collected in Pauoa Valley, Oahu, by O. H. Swezey, January 23, 1909, respectively allotype and paratype. One ♀ collected in Palolo Valley, Oahu, by D. T. Fullaway, August 12, 1912, and one collected on Olympus mountain, Oahu, January 14, 1912, paratypes.

Type: Cat. No. 52, Bishop Museum.

53. *Sierola fuscipes* n.sp.

♀ dull shining black, the legs and antennæ fuscous.

Head and thorax with a microscopically fine reticulate surface sculpture; fairly closely and finely punctate; hairy clothing short and inconspicuous. Head a little longer than wide, width between the eyes a little more than the length from eye to vertex, length in front of the eyes not great; convex above and beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ a little longer than the head, pedicel longer than wide, following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, declivous at the sides, the carina extending backward on the top of the head a little beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula and sides of the head convex, the former medially foreshortened, wider than long, anterior margin arcuately concave, posterior margin incised, abdomen elongate ovate, smooth and polished; wings with a fuscous pigmentation; length 2.5 mms.

Described from five females (type and paratypes) from Kilauea, Hawaii, dry forest, 4000 ft. elevation, three ♀♀ collected by Giffard and Muir, November 1, 1917, and numbered 4, one of which is the type; in addition to the paratypes in this series, 1 ♀ collected by W. M. Giffard, July 6, 1918, and another ♀ collected June 12, 1900, and numbered 12, paratypes.

Type: Cat. No. 53, Bishop Museum.

54. *Sierola flavipennis* n.sp.

♀ depressed, flat; shining black, legs and antennæ yellowish brown, mandibles apically reddish brown.

Head and thorax with a microscopically fine reticulate surface sculpture; finely, shallowly and somewhat sparsely punctate; hairy clothing short and inconspicuous. Head wider than the thorax, longer than wide, width between the eyes equalling the length from eye to vertex, length in front of the eyes not great; rather flat above and beneath; vertical margin straight, temples rounded, eyes convex; antennæ longer than the head, the pedicel and first funicle segment somewhat longer than wide, the following segments hardly so, antennal fossæ deep; clypeus short, almost vertical, carinate, slightly projecting in front of the anterior margin of the head, sloping at the sides; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula and sides of the head flat, the former medially foreshortened, wider than long, narrowing behind where it is rather convex, anterior margin arcuately concave, posterior margin incised, median groove effaced; abdomen elongate ovate, smooth and polished; wings subinfuscate, with a yellowish brown pigmentation; length 2.25 mms.

Described from one female (type) collected, Kaumuohona, Oahu, by P. H. Timberlake, April 23, 1916.

Type: Cat. No. 54, Bishop Museum.

55. *Sierola lepida* n.sp.

♀ shining black, the legs, antennæ basally and the mandibles except at the base, flavous, antennæ distally fuscous.

Head and thorax with a microscopically fine reticulate surface sculpture; finely, shallowly and closely punctate; hairy clothing short and delicate. Sides of the pronotum aciculate. Head a little longer than wide, widest across the eyes, narrowing behind and in front, width between the eyes considerably more than (1½ ×) the length from eye to vertex; convex above, tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, widening outwardly, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula and sides of the head flat, the former medially foreshortened, as long as wide, narrowing behind where it is inconspicuously divided into two lobes by a shallow depression on the median line, anterior margin arcuately concave, posterior margin incised; abdomen depressed, ovate, smooth and polished; wings infuscate, with a yellowish brown pigmentation; length 2.75 mms.

Described from one female (type) collected at Glenwood, Hawaii, 2800 ft. elevation, by Giffard and Muir, October 1, 1917.

Type: Cat. No. 55, Bishop Museum.

56. *Sierola callida* n.sp.

♀ shining black, the legs and antennæ fuscous.

Head and thorax with a microscopically fine reticulate surface sculpture; fairly closely, coarsely and shallowly punctate and hairy. Head wider than the thorax, longer than wide, width between the eyes equalling the length from eye to vertex; convex above and beneath; depressed in front; vertical margin straight, temples rounded, eyes flatly convex; antennæ a little longer than the head, pedicel and first funicle segment a little longer than wide, following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula convex, not much foreshortened, anterior margin arcuately concave, posterior margin incised; abdomen ovate, smooth and polished; wings subinfuscate, with a yellowish-brown pigmentation; length 2.75 mms.

♂ smaller, head shorter, vertical margin arcuately convex, mandibles luteous except at the base, abdomen bluntly pointed at the apex.

Described from one female and three males (type, allotype and paratypes) collected on Kaala mountain, Oahu. Type collected by P. H. Timberlake, July 4, 1916. Three ♂♂ collected by P. H. Timberlake, at 1500-2500 ft. elevation, March 4, 1917, one on *Bobea elatior*, allotype and paratypes.

Type: Cat. No. 56, Bishop Museum.

57. *Sierola longicornis* n.sp.

♀ dull black but not opaque, legs and antennæ yellowish brown to fuscous, the former with the femora fuscous outwardly, the latter fuscous distally from the first funicle segment.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, coarser on the head; rather coarsely, shallowly and closely punctate and hairy. Head a little longer than wide, widest across the eyes, narrowing in front and behind, width between the eyes more than the length from eye to vertex; convex above, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ considerably longer than the head, all the segments more than twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate and toothed apically, base almost touching the eye above; gula and sides of the head flat, the former not much foreshortened medially, longer than wide, anterior margin arcuately concave, posterior margin incised, the median groove nearly effaced; propodeum rugulose, a small triangular area medially at the base smooth; abdomen ovate, brilliantly polished; wings subinfuscate, with a yellowish brown pigmentation; length 2.75 mms.

Described from one female (type) collected at Kilauea, Hawaii, 29 miles, by W. M. Giffard, January, 1915.

Type: Cat. No. 57, Bishop Museum.

58. *Sierola scoriacea* n.sp.

♀ shining black, the head a little dull; antennæ, trochanters, tibiæ and tarsi testaceous, femora fuscous.

Head and thorax with a microscopically fine reticulate surface sculpture; finely, shallowly and closely punctate; rather thickly clothed with fine silvery gray hairs. Head longer than wide, width between the eyes a little more than the length from eye to vertex; convex above and beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ a little longer than the head, the segments hardly longer than wide, antennal fossæ deep; clypeus reduced by erosion from the sides to a thin, carinate ridge, apically depressed and projecting slightly in front of the anterior margin of the head, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula and sides of the head flat, the former medially foreshortened, wider than long, narrowing behind, where it is rather convex, anterior margin nearly straight, posterior margin incised, the median groove effaced; abdomen ovate, smooth and polished; wings subinfuscate, with a yellowish brown pigmentation; length 2 mms.

Described from one female (type) collected on Kau, Hawaii, a-a flows, 3600 ft. elevation, by W. M. Giffard, July 18th, 1918.

Type: Cat. No. 58, Bishop Museum.

59. *Sierola gracillima* n.sp.

♀ shining black, the head a little dull; legs fuscous, antennæ yellowish brown, outwardly infuscate.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; finely and somewhat remotely punctate; hairy clothing inconspicuous. Head considerably longer than wide, width between the eyes equalling the length from eye to vertex, length in front of the eyes not great; flatly convex above and beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ not much longer than the head, pedicel longer than wide, following segments as wide as long, antennal fossæ deep; clypeus short, carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides; mandibles fairly stout, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula and sides of the head convex, the former medially foreshortened, as wide as long, anterior margin arcuately concave, posterior margin incised; abdomen elongate ovate, smooth and shining; wings subinfuscate, with a yellowish brown pigmentation; length 2 mms.

Described from one female (type) collected at Punaluu, Oahu, by O. H. Swezey, June 11, 1911.

Type: Cat. No. 59, Bishop Museum.

60. *Sierola brunneipes* n.sp.

♀ dull shining black, legs and antennæ brown, the latter fuscous apically.

Head and thorax with a microscopically fine reticulate surface sculpture; finely and fairly closely punctate; hairy clothing short and inconspicuous. Head wider than the thorax, a little longer than wide, width between the eyes equalling the length from eye to vertex; convex above and beneath; vertical margin straight, temples rounded, eyes flat; antennæ not much longer than the head, pedicel a little longer than wide, following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, truncate apically and toothed, base touching the eye above; gula flatly convex, medially foreshortened, as wide as long, anterior margin nearly straight, posterior margin incised; abdomen elongate ovate, smooth and polished; wings subinfuscate, with a yellowish brown pigmentation; length 2.25 mms.

Described from five females (type and paratypes) from Tantalus mountain, Oahu. Type collected by W. M. Giffard, February 16, 1916. One specimen swept from *Acacia koa* by J. C. Bridwell, July 5, 1915, and three others collected on *Acacia koa* by J. C. Bridwell, June, 1918, paratypes.

Type: Cat. No. 60, Bishop Museum.

61. *Sierola arida* n.sp.

♀ dull black, almost opaque; legs and antennæ brown to fuscous.

Head and thorax with a microscopically fine and close reticulate surface sculpture; finely and somewhat remotely punctate and hairy. Head longer than wide, widest across the eyes, narrowing slightly behind and in front, width between the eyes equalling the length from eye to vertex; convex above, depressed in front, a little tumid beneath, the greatest depth directly behind the middle; vertical margin slightly concave, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, pedicel and funicle twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles fairly stout, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula and sides of the head rather flat, the former medially foreshortened, a little longer than wide, narrowing behind, anterior margin arcuately concave, posterior margin incised; abdomen elongate ovate, smooth and polished; wings fuscous, with a yellowish brown pigmentation; length 2.75 mms.

Described from two females (type and paratype) collected on Kaala mountain, Oahu, by O. H. Swezey, September 7, 1913.

Type: Cat. No. 61, Bishop Museum.

62. *Sierola punctata* n.sp.

♀ dull black, head nearly opaque, the legs flavous, antennæ yellowish brown to fuscous.

Head and thorax with a microscopically fine reticulate surface sculpture; closely, finely and shallowly punctate and hairy; punctuation on the thorax very fine, that on the head coarser. Head longer than wide, width between the eyes a little more than the length from eye to vertex; convex above and beneath; vertical margin straight, temples rounded, eyes convex; antennæ a little longer than the head, all the segments longer than wide, antennal fossæ deep; clypeus reduced by erosion from the sides to a thin, carinate ridge, apically depressed and projecting slightly in front of the anterior margin of the head, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles fairly stout, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula and sides of the head convex, the former medially foreshortened, as long as wide, anterior margin arcuately concave, posterior margin incised; abdomen elongate ovate, smooth and polished; wings with a yellowish brown pigmention; length 2.75 mms.

Described from one female (type) collected on Kaala mountain, Oahu, at 2000 ft. elevation, by P. H. Timberlake in sweeping a species of *Kadua*, March 4, 1917.

Type: Cat. No. 62, Bishop Museum.

63. *Sierola brunnea* n.sp.

♀ moderately flat; shining black, the head, pronotum and abdomen piceous; legs, mandibles and antennæ basally yellowish brown, antennæ fuscous outwardly.

Head and thorax to the propodeum with a microscopically fine and close reticulate surface sculpture; finely and fairly closely punctate; rather thinly clothed with long delicate hairs. Head a little longer than wide, width between the eyes a little more than the length from eye to vertex; flat above, a little tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin straight, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, pedicel a little longer than wide, following segments as wide as long, antennal fossæ deep; clypeus short, carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward a little on the top of the head; mandibles fairly stout, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula and sides of the head flat, the former medially foreshortened, as long as wide, narrowing behind, where it is indistinctly divided into two lobes by a shallow depression posteriorly on the median line, anterior margin straight, posterior margin incised; propodeum finely rugulose; abdomen ovate, apically acuminate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.25 mms.

Described from two females (type and paratype) from Tantalus mountain, Oahu, 1300 ft. elevation. Type collected by W. M. Giffard January 29, 1905. Second specimen collected by O. H. Swezey, August 4, 1912, paratype.

Type: Cat. No. 63, Bishop Museum.

64. *Sierola picea* n.sp.

♀ shining black, the head somewhat piceous; legs and antennæ luteous, the latter infuscate outwardly, mandibles brown.

Head and thorax with a microscopically fine reticulate surface sculpture; finely, shallowly and fairly closely punctate; thinly clothed with short, delicate, silvery white hairs. Head nearly twice as long as wide, width between the eyes equalling the length from eye to vertex; convex above and beneath; temples rounded, eyes flatly convex; antennæ a little longer than the head, pedicel twice as long as wide, following segments as wide as long or hardly longer, antennal fossæ deep; clypeus carinate, apically depressed, projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, flattened outwardly, truncate apically and toothed, base touching the eye above; gula flatly convex, medially foreshortened, a little longer than wide, slightly depressed along the median line, anterior margin arcuately concave, posterior margin incised; abdomen ovate, smooth and polished; wings hyaline; length 2 mms.

Described from one female (type) collected on Tantalus mountain, Oahu, 1300 ft. elevation, by W. M. Giffard, January 15, 1905.

Type: Cat. No. 64, Bishop Museum.

65. *Sierola streblognatha* n.sp.

♀ shining black, antennæ basally and the legs brown, with the exception of the femora, which are blackish in the middle.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, fairly coarsely, shallowly and remotely punctate and hairy. Head a little longer than wide, widest across the eyes, narrowing behind and in front, width between the eyes considerably more than the length from eye to vertex; convex above, depressed in front, tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin slightly concave, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, the segments of the flagellum all longer than wide, pedicel twice as long as wide, and the first funicle segment nearly so, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles fairly stout, bent near the base, the distal portion twisted and flattened, apical margin obliquely truncate and toothed, base touching the eye above; gula and sides of the head flat, the former medially very much foreshortened, wider than long, anterior margin arcuately concave, posterior margin incised; propodeum rugulose; abdomen short ovate, smooth and polished; wings subinfuscate, with a rather faint yellowish brown pigmentation; length about 3 mms.

Described from one female (type) collected at Puuwaawaa, N. Kona, Hawaii, 3700 ft. elevation, by W. M. Giffard, August, 1917.

Type: Cat. No. 65, Bishop Museum.

66. *Sierola opaeula* n.sp.

♀ shining black, antennæ brown, outwardly fuscous, tibiæ and tarsi yellowish brown to fuscous.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; finely and fairly closely punctate; hairy clothing short and inconspicuous. Head nearly twice as long as wide, width between the eyes equalling the length from eye to vertex; convex above, depressed in front, a little tumid beneath; vertical margin nearly straight, temples rounded, eyes flatly convex; antennæ not much longer than the head, the pedicel a little longer than wide, following segments as wide as or wider than long, antennal fossæ deep; clypeus short, carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head to the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula and sides of the head rather flat, the former medially foreshortened, as wide as long, narrowing behind where it is inconspicuously divided into two lobes by a shallow median depression, anterior margin arcuately concave, posterior margin incised; propodeum finely rugulose; abdomen elongate ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.25 mms.

Described from one female (type) collected at Opaeula, Oahu, by D. T. Fullaway, March 30, 1913.

Type: Cat. No. 66, Bishop Museum.

67. *Sierola mandibularis* n.sp.

♀ shining black, antennæ basally brown, fuscous outwardly, apex of the femora, tibiæ and tarsi yellowish brown.

Head and thorax with a microscopically fine reticulate surface sculpture; fairly coarsely and closely punctate; hairy clothing short and delicate. Head longer than wide, widest across the eyes, narrowing behind and in front, width between the eyes a little more than the length from eye to vertex; flatly convex above, depressed in front, a little tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin slightly convex, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward a little on the top of the head; mandibles slender, curved, flattened outwardly, the apical margins truncate and toothed, base touching the eye above; gula and sides of the head flat, the former medially foreshortened, no longer than wide, closely and finely punctate, the groove nearly effaced, anterior margin arcuately concave, posterior margin incised; abdomen ovate, smooth and polished; wings subinfuscate; length 2.5 mms.

Described from one female (type) collected on the Pauoa side of Tantalus mountain, Oahu, by J. C. Bridwell, July 15, 1916.

Type: Cat. No. 67, Bishop Museum.

68. *Sierola minuta* n.sp.

♀ small, shining black, legs and antennæ yellowish brown to fuscous.

Head and thorax with a microscopically fine reticulate surface sculpture; finely and somewhat remotely punctate; hairy clothing short and inconspicuous. Head a little longer than wide, width between the eyes more than the length from eye to vertex; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ a little longer than the head, the pedicel longer than wide, following segments as wide as long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of head beyond the base of the antennæ; mandibles slender, curved, truncate and toothed apically, base touching the eye above; gula and sides of the head convex, the former medially foreshortened, wider than long, anterior margin arcuately concave, posterior margin incised; abdomen short ovate, smooth and polished; wings subinfuscate; length 2 mms.

Described from one female (type) collected in Middle Puna, Hawaii, at 750 ft. elevation, by W. M. Giffard, August 6, 1918.

Type: Cat. No. 68, Bishop Museum.

69. *Sierola hirsuta* n.sp.

♀ shining black, legs, antennæ basally and mandibles light yellowish brown.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, a little coarser on the head; coarsely, shallowly and closely punctate; thickly clothed with long silvery hairs. Head longer than wide by a half, width between the eyes more than the length from eye to vertex; convex above, depressed in front, a little tumid beneath; vertical margin slightly convex, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, all the segments a little longer than wide, pedicel twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base not quite reaching the eye above; gula and sides of the head flat, the former medially foreshortened, a little longer than wide, narrowing behind, where it is somewhat convex, anterior margin arcuately concave, posterior margin incised; propodeum rugulose, dull; abdomen ovate, smooth and polished; wings subinfuscate, with a very faint yellowish brown pigmentation; length 2.25 mms.

♂ smaller, head shorter, abdomen bluntly pointed at the apex.

Described from eight females and two males (type, allotype and paratypes). Type from Niu, Oahu, collected by P. H. Timberlake, February 10, 1918, allotype from Kaala mountain, collected March 4, 1917. Four ♀ ♀ collected same date, one collected July 9, 1916, and one ♂ collected July 22, 1917, on Kaala mountain, together with two ♀ ♀ collected on Tantalus mountain, at 1500 ft. elevation, by W. M. Giffard, August 27 and December 22, 1918, respectively, paratypes.

Type: Cat. No. 69, Bishop Museum.

70. *Sierola striata* n.sp.

♀ shining black, antennæ basally yellowish brown, fuscous outwardly, legs brown, the femora somewhat infuscate.

Head and thorax to the propodeum with a microscopically fine and delicate reticulate surface sculpture; finely, closely, somewhat sparsely punctate; hairy clothing short and inconspicuous. Head wider than the thorax, longer than wide by a half, width between the eyes a little more than the length from eye to vertex, length in front of the eyes not great; convex above, depressed in front, a little tumid beneath, the greatest depth behind the eyes; vertical margin straight, temples rounded, eyes flatly convex; antennæ a little longer than the head, the segments of the flagellum all longer than wide, the pedicel twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula and sides of the head convex, the former medially foreshortened, as wide as long, anterior margin arcuately concave, posterior margin incised; pronotum aciculate at the sides; scutellum smooth and impunctate; propodeum rugulose; abdomen elongate ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.75 mms.

Described from one female (type) collected in Palolo valley, Oahu, by D. T. Fullaway, August 12, 1912.

Type: Cat. No. 70, Bishop Museum.

71. *Sierola agens* n.sp.

♀ shining black, the legs and antennæ luteous, the latter fuscous outwardly.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, which is very delicate on the head; finely, fairly closely and rather sparsely punctate; hairy clothing short and delicate. Head longer than wide by a half, width between the eyes a little more than the length from eye to vertex; convex above and beneath, depressed in front; vertical margin nearly straight, temples rounded, eyes flatly convex; antennæ not much longer than the head, pedicel more than twice as long as wide, first two funicle segments a little longer than wide, following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula flatly convex, medially foreshortened, wider than long, anterior margin arcuately concave, posterior margin incised; propodeum rugulose; abdomen ovate, smooth and polished; wings subinfuscate; length 2.75 mms.

Described from one female (type), collected in Nuuanu valley, Oahu, by D. T. Fullaway, August 20, 1916.

Type: Cat. No. 71, Bishop Museum.

72. *Sierola pygmaea* n.sp.

♀ small, the thorax and abdomen unusually short; shining black, not brilliant, legs and two basal joints of antennæ yellowish brown, antennæ apically fuscous.

Head and thorax with a microscopically fine reticulate surface sculpture, a little coarser on the head; fairly coarsely, shallowly and closely punctate; hairy clothing short and delicate. Head wider than the thorax, longer than wide by a half, width between the eyes equalling the length from eye to vertex, length in front of the eyes not great; flatly convex above, depressed in front and a little tumid beneath, the greatest depth behind the eye; vertical margin straight, temples rounded, eyes convex; antennæ scarcely longer than the head, pedicel twice as long as wide, following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate apically and toothed, base not quite reaching the eye above; gula and sides of the head convex, the former a little foreshortened medially, as wide as long, anterior margin arcuately concave, posterior margin incised; abdomen depressed, short ovate, smooth and polished; wings subinfuscate; length 2 mms.

Described from one female (type) collected on Cooke's Trail, Nuuanu Valley, Oahu, by D. T. Fullaway, August 20, 1916.

Type: Cat. No. 72, Bishop Museum.

73. *Sierola tumidoventris* n.sp.

♀ shining black, antennæ and legs brown to fuscous.

Head and thorax with a microscopically fine reticulate surface sculpture; fairly closely, shallowly and finely punctate; hairy clothing rather short and delicate. Head wider than the thorax, longer than wide by a half, width between the eyes equalling the length from eye to vertex, length in front of the eyes not great; somewhat flat above, convex beneath; vertical margin straight, temples rounded, eyes convex; antennæ scarcely longer than the head, pedicel about twice as long as wide, following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, declivous at the sides, the carina extending backward a little on the top of the head; mandibles stout, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula convex, a little foreshortened medially, anterior margin arcuately concave, posterior margin incised; abdomen elongate ovate, smooth and brilliantly polished, somewhat tumid beneath; wings hyaline; length 2.5 mms.

Described from one female (type) collected on Cooke's Trail, Nuuanu Valley, Oahu, by D. T. Fullaway, August 20, 1916.

Type: Cat. No. 73, Bishop Museum.

74. *Sierola koolauensis* n.sp.

♀ shining black, antennæ brown, fuscous outwardly, legs fuscous, tibiæ and tarsi yellowish brown.

Head and thorax with a microscopically fine reticulate surface sculpture; closely, shallowly, fairly coarsely punctate, and hairy. Head longer than wide by one-half, width between the eyes a little more than the length from eye to vertex; flatly convex above, depressed in front, convex beneath, the greatest depth directly behind the eyes; vertical margin straight, temples rounded, eyes flat; antennæ no longer than the head, pedicel a little longer than wide, following segments as wide as long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides; mandibles stout, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula flatly convex, medially foreshortened, as wide as long, anterior margin nearly straight, posterior margin incised; abdomen short ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.25 mms.

Described from two females (type and paratype). Type from S. E. Koolau mountains, Oahu, collected by J. C. Bridwell, 1916. Second specimen, from Kuliouou, collected by P. H. Timberlake, June 25, 1916, and marked "no. 20", paratype.

Type: Cat. No. 74, Bishop Museum.

75. *Sierola koebelei* n.sp.

♀ shining black, almost brilliant, antennæ brown, fuscous outwardly, legs fuscous, tibiæ and tarsi brown.

Head and thorax with a microscopically fine reticulate surface sculpture; finely, shallowly, somewhat sparsely punctate, and hairy. Head longer than wide by one-half, width between the eyes equalling the length from eye to vertex; rather flat above, convex beneath, the greatest depth at the middle; vertical margin straight, temples rounded, eyes flatly convex; antennæ scarcely longer than the head, pedicel a little longer than wide, following segments as wide as long or nearly so, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles fairly stout, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula and sides of the head convex, medially foreshortened, as wide as long, anterior margin arcuately concave, posterior margin incised; abdomen elongate ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 3 mms.

Described from one female (type) collected by Koebele on Oahu.

Type: Cat. No. 75, Bishop Museum.

76. *Sierola longiceps* n.sp.

♀ shining black, head and thorax a little dull; antennæ brown basally, fuscous outwardly, trochanters, tibiæ, tarsi and apex of femora yellowish brown, mandibles reddish at apex.

Head and thorax with a microscopically fine and close reticulate surface sculpture; finely, shallowly and closely punctate; rather thickly clothed with long silvery hairs. Head nearly twice as long as wide, widest across the eyes, narrowing behind and in front, width between the eyes a little more than the length from eye to vertex; flat on top, depressed in front, a little tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin straight, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, all the segments longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base not reaching the eye; gula and sides of the head flat, the former medially foreshortened, a little longer than wide, narrowing behind, the median groove entirely effaced, anterior margin straight, posterior margin incised; propodeum rugulose; abdomen short ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.75 mms.

Described from one female (type) collected at Kilauea, Hawaii, 4000 ft. elevation, by W. M. Giffard, October, 1915.

Type: Cat. No. 76, Bishop Museum.

77. *Sierola rugulosa* n.sp.

♀ dull shining black, antennæ yellowish brown, fuscous outwardly, legs fuscous, mandibles brown except at the base.

Head and thorax to the propodeum with a microscopically fine, fairly coarse reticulate surface sculpture, coarser on the head; coarsely, shallowly and rather closely punctate; thinly clothed with silvery hairs. Head longer than wide by a half, width between the eyes equalling the length from eye to vertex; length in front of the eyes not great; convex above and beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ not much longer than the head, pedicel twice as long as wide, first six funicle segments as wide as long, the following segments longer than wide, antennal fossæ deep; clypeus short, carinate, almost vertically depressed and projecting slightly in front of the anterior margin of the head, the carina extending backward a little on the top of the head; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula convex, a little foreshortened medially, anterior margin arcuately concave, posterior margin incised, sides of the head flat; propodeum finely sculptured, brilliant; abdomen elongate ovate, smooth and polished; wings subinfuscate; length 2.25 mms.

Described from one female (type) collected on Palolo Hill trail, Oahu, by P. H. Timberlake, April 7, 1916, and numbered 16.

Type: Cat. No. 77, Bishop Museum.

78. *Sierola brevicauda* n.sp.

♀ shining black, a little dull; antennæ yellowish brown at the base, outwardly fuscous, legs fuscous basally, outwardly yellowish brown, mandibles reddish apically.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, coarser on the head, very delicate on the scutellum; closely, shallowly and fairly coarsely punctate and hairy. Head longer than wide by a half, width between the eyes a little more than the length from eye to vertex; flatly convex above, depressed in front, convex beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the scutellum, all the segments longer than wide, pedicel more than twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head to the anterior margin of the eyes; mandibles slender, curved, twisted and flattened outwardly, truncate apically and toothed, base not reaching the eye; gula and sides of the head rather flat, the former narrowing behind, where it is indistinctly divided into two lobes by a shallow median depression, anterior margin almost straight; propodeum finely rugulose; abdomen short ovate, smooth and polished; wings hyaline; length 2 mms.

Described from one female (type) collected in Nuuanu Valley, Oahu, by D. T. Fullaway, March 4, 1912.

Type: Cat. No. 78, Bishop Museum.

79. *Sierola kilauea* n.sp.

♀ dull shining black, legs and antennæ yellowish brown, the latter fuscous outwardly, the former fuscous basally, mandibles reddish at apex.

Head and thorax with a microscopically fine and close reticulate surface sculpture; finely, shallowly and closely punctate; clothed with fairly long silvery hairs. Head somewhat longer than wide, widest across the eyes, narrowing behind and in front, width between the eyes more than the length from eye to vertex; flatly convex above, a little tumid beneath, deepest under the eye; vertical margin straight, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, all the segments longer than wide, pedicel and funicle more than twice as long as wide, antennal fossæ deep; clypeus reduced by erosion from the sides to a thin carinate ridge, almost vertically depressed and projecting slightly in front of the anterior margin of the head, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula and sides of the head flat, the former nearly as wide as long, narrowing posteriorly, anterior margin arcuately concave, posterior margin incised, median groove shallow; propodeum finely rugulose; abdomen ovate, apically acuminate, as long as the head and thorax together, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 3 mms.

Described from one female (type) collected at Kilauea, Hawaii, 4000 ft. elevation, by W. M. Giffard, June 7, 1908, and numbered 7.

Type: Cat. No. 79, Bishop Museum.

80. *Sierola olympiana* n.sp.

♀ dull shining black, antennæ yellowish brown, fuscous outwardly, legs fuscous, tibiæ and tarsi yellowish brown.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, coarser on the head; closely and coarsely punctate; clothed with fairly stiff silvery hairs. Head longer than wide by a half, width between the eyes a little more than the length from eye to vertex; flatly convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, all the segments a little longer than wide, pedicel twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, the carina extending backward on the top of the head beyond the anterior margin of the eyes; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula and sides of the head flat, the latter smooth and polished, the former longer than wide, narrowing behind, anterior margin arcuately concave, posterior margin incised; propodeum finely rugulose; abdomen ovate, smooth and polished; wings subinfuscate; length 2.25 mms.

Described from two females (type and paratype). Type from Mt. Olympus, Oahu, collected by P. H. Timberlake, June 18, 1916. Second specimen, collected by Mr. Timberlake on the Cooke Trail, Nuuanu Valley, January 7, 1917, paratype.

Type: Cat. No. 80, Bishop Museum.

81. *Sierola tenebriosa* n.sp.

♀ dull shining black, legs and antennæ yellowish brown, the latter fuscous outwardly, mandibles except at the base, and apex of the clypeus reddish brown.

Head and thorax to the propodeum with a microscopically fine and delicate reticulate surface sculpture; very finely, shallowly and somewhat remotely punctate; hairy clothing sparse and delicate. Head not much longer than wide, width between the eyes twice the length from eye to vertex; flatly convex above, depressed in front, a little tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin slightly convex, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula and sides of the head flatly convex, the former medially foreshortened, as wide as long, anterior margin nearly straight, posterior margin incised; propodeum finely rugulose; abdomen short ovate, apically acuminate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.75 mms.

Described from two females (type and paratype). Type from Mt. Olympus, Oahu, collected by P. H. Timberlake, July 31, 1917. Second specimen collected by D. T. Fullaway on the Cooke Trail, Nuuanu Valley, August 20, 1916, paratype.

Type: Cat. No. 81, Bishop Museum.

82. *Sierola capuana* n.sp.

♀ dull shining black, legs and antennæ luteous, the latter fuscous outwardly, mandibles yellowish brown.

Head and thorax with a microscopically fine and close reticulate surface sculpture; fairly coarsely and closely punctate and hairy. Head a little longer than wide, widest across the eyes, narrowing behind and in front, width between the eyes considerably more than the length from eye to vertex; flatly convex above, depressed in front, tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin straight, temples rounded, eyes flatly convex, antennæ a little longer than the head, all the segments a little longer than wide, pedicel twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles rather slender, curved, truncate apically and toothed, base touching the eye above; gula and sides of the head flatly convex, the former medially foreshortened, wider than long, anterior margin nearly straight, posterior margin incised, median groove nearly effaced; abdomen short ovate, apically acuminate, smooth and polished; wings hyaline, length 2.25 mms.

♂ smaller, head a little shorter, abdomen bluntly pointed.

Described from three females and one male (type, allotype and paratypes) from Niu, Oahu. Type reared from the larva of *Capua cassia* by O. H. Swezey, May 16, 1909; allotype and paratypes from the larva of *Archips longiplicatus*, June 27, 1909.

Type: Cat. No. 82, Bishop Museum.

83. *Sierola megalops* n.sp.

♀ shining black, the head dull; legs and antennæ basally light yellowish brown, the latter outwardly fuscous, mandibles reddish apically.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, coarser on the head; finely, shallowly and fairly closely punctate, hairy clothing short and inconspicuous. Head a little longer than wide, widest across the eyes, narrowing in front and behind, width between the eyes nearly twice the length from eye to vertex; flatly convex above, depressed in front, tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin slightly convex, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments considerably longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base not quite reaching the eye; gula and sides of the head flatly convex, the former medially foreshortened, wider than long, anterior margin straight, posterior margin incised; propodeum finely rugulose; abdomen ovate, smooth and shining; wings hyaline; length 2.75 mms.

Described from one female (type) collected in Manoa Valley, Oahu, by D. T. Fullaway, July 29, 1917.

Type: Cat. No. 83, Bishop Museum.

84. *Sierola vestita* n.sp.

♀ dull shining black, legs testaceous, front and hind femora fuscous outwardly, antennæ brown, fuscous apically.

Head and thorax to the propodeum with a microscopically fine and close reticulate surface sculpture; finely and very closely punctate; hairy clothing long and thick. Head longer than wide by the length in front of the eyes, widest across the posterior end of the eyes, narrowing behind and in front, width between the eyes greater than the length from eye to vertex; convex above, a little tumid beneath; vertical margin straight, temples rounded, eyes flat, antennæ reaching the mesoscutum, all the segments longer than wide, antennal fossæ deep; clypeus reduced by erosion from the sides to a thin, carinate ridge, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base not quite reaching the eye; gula and sides of the head flatly convex, the former medially foreshortened, wider than long, anterior margin nearly straight, posterior margin incised; propodeum finely rugulose; abdomen ovate, apically acuminate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.75 mms.

Described from one female (type) collected in the Waianae mountains, Oahu, by D. T. Fullaway, March 5, 1911.

Type: Cat. No. 84, Bishop Museum.

85. *Sierola mauiensis* n.sp.

♀ dull shining black, legs yellowish brown, the femora infuscate, antennæ brown to fuscous.

Head and thorax with a microscopically fine and close reticulate surface sculpture; finely, shallowly and closely punctate, and hairy. Head a little longer than wide, widest across the posterior end of the eyes, narrowing behind and in front, width between the eyes considerably more than the length from eye to vertex; flatly convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ a little longer than the head, pedicel about twice as long as wide, following segments scarcely longer than wide, antennal fossæ deep; clypeus reduced by erosion from the sides to a thin, carinate ridge, apically depressed and projecting slightly in front of the anterior margin of the head, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula and sides of the head flat, the former medially foreshortened, wider than long, narrowing behind, anterior margin straight, a shallow depression along the median line posteriorly, the margin incised; abdomen ovate, smooth and polished; wings subinfuscate; length 2.5 mms.

Described from one female (type) collected on Maui, by Koebele.

Type: Cat. No. 85, Bishop Museum.

86. *Sierola rufignatha* n.sp.

♀ dull shining black, legs, clypeus apically and antennæ basally luteous, the last outwardly fuscous, mandibles reddish brown except at the base.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; finely, shallowly and remotely punctate, hairy clothing sparse, punctuation coarser on the head. Head a little longer than wide, width between the eyes exceeding the length from eye to vertex; convex above, a little tumid beneath, the greatest depth beneath the eye; vertical margin slightly convex, temples rounded, eyes convex; antennæ reaching almost to the scutellum, all the segments longer than wide, the pedicel and first funicle segment twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed a little and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles large, fairly stout, bent at basal third, the distal portion flattened, obliquely truncate apically and toothed, base touching the eye above; sides of the head and gula in front flatly convex, the latter tumid behind, medially foreshortened, the anterior margin arcuate, posterior margin incised; propodeum coarsely rugulose, with a smooth area at the base medially; abdomen short ovate, smooth and polished; wings hyaline; length 2 mms.

Described from one female (type) collected in Nuuanu Valley, Oahu, by D. T. Fullaway, August 20, 1916.

Type: Cat. No. 86, Bishop Museum.

87. *Sierola lugens* n.sp.

♀ shining black, a little dull on the head, legs and antennæ luteous, mandibles yellowish brown.

Head and thorax with a microscopically fine reticulate surface sculpture, a little coarser on the head; finely, closely and shallowly punctate, and hairy. Head wider than the thorax, a little longer than wide, widest across the eyes, narrowing a little behind and in front, width between the eyes greater than the length from eye to vertex; flat on top, depressed in front, a little tumid beneath, deepest under the posterior end of the eye but without great depth; vertical margin straight, temples rounded, eyes flatly convex; antennæ not much longer than the head, pedicel nearly twice as long as wide, the following segments scarcely longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward shortly on the top of the head; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula and sides of the head flat, the former medially foreshortened, as wide in front as long but narrowing behind where the margin is incised and the median line a little depressed, anterior margin straight; abdomen a little depressed, elongate ovate, smooth and polished; wings with a faint yellowish brown pigmentation; length 2.75 mms.

♂ a little smaller, the head shorter and hardly as flat, the abdomen bluntly pointed apically.

Described from one female and two males (type, allotype and paratype) collected at Opaeula, Oahu, by D. T. Fullaway, March 30, 1913.

Type: Cat. No. 87, Bishop Museum.

88. *Sierola swezeyi* n.sp.

♀ shining black, the head a little dull; trochanters, tibiæ, tarsi and antennæ basally yellowish brown, the last fuscous outwardly.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, a little coarser on the head; fairly closely and coarsely punctate; hairy clothing long, thin, and delicate. Head a little longer than wide, width between the eyes greater than the length from eye to vertex; convex above, tumid beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ reaching the scutellum, all the segments considerably longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base not quite reaching the eye; gula and sides of the head flat, the former medially foreshortened, longer than wide, narrowing behind, anterior margin nearly straight, posterior margin incised; propodeum finely rugulose; abdomen ovate, smooth and polished; wings subinfuscate, nearly hyaline; length 2 mms.

Described from one female (type) collected on Konahuanui Peak, Oahu, by O. H. Swezey, February 23, 1914.

Type: Cat. No. 88, Bishop Museum.

89. *Sierola eucrena* n.sp.

♀ dull shining black, legs and antennæ brown.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, a little coarser on the head, very delicate on the scutellum; coarsely, shallowly and fairly closely punctate, and hairy. Head a little longer than wide, widest across the eyes, narrowing in front and behind, width between the eyes a little more than the length from eye to vertex; flatly convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, antennal fossæ deep; clypeus reduced by erosion from the sides to a thin, carinate ridge, apically depressed and projecting slightly in front of the anterior margin of the head, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base not quite reaching the eye; sides of the head flat, gula flatly convex, medially foreshortened, wider than long, narrowing behind, anterior margin arcuately concave, posterior margin incised; propodeum rugulose, with a median longitudinal line dorsally; abdomen ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.75 mms.

Described from one female (type) collected on Hawaii by Koebele.

Type: Cat. No. 89, Bishop Museum.

90. *Sierola ehrhorni* n.sp.

♀ shining black, a little dull on the head; antennæ fuscous, trochanters, tibiæ and tarsi yellowish brown.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, a little coarser on the head; fairly closely, shallowly and finely punctate; hairy clothing rather short and erect. Head a little longer than wide, widest across the eyes, narrowing behind and in front, width between the eyes a little more than the length from eye to vertex; flatly convex above, a little tumid beneath; vertical margin nearly straight, temples rounded, eyes flatly convex; antennæ broken a little beyond the middle, the segments of the stumps all longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base not reaching the eye; gula and sides of the head flat, the former medially foreshortened, scarcely as long as wide, narrowing behind, median groove nearly effaced, anterior margin arcuately concave, posterior margin incised; propodeum finely rugulose; abdomen short ovate, smooth and polished; wings subinfuscate, with a faint fuscous pigmentation; length 2.25 mms.

Described from one female (type) collected at Kilauea, Hawaii, 4000 ft. elevation, by W. M. Giffard, in January, 1916.

Type: Cat. No. 90, Bishop Museum.

91. *Sierola kaduana* n.sp.

♀ dull shining black, antennæ fuscous, legs luteous.

Head and thorax with a microscopically fine reticulate surface sculpture; uniformly, closely and shallowly punctate, and hairy; the sculpture and punctuation coarser on the head, the hairy clothing short, stiff and silvery white. Head a little longer than wide, width between the eyes a little more than the length from eye to vertex; flat above, convex beneath; vertical margin straight, temples rounded, eyes convex; antennæ a little longer than the head, pedicel longer than wide, the following segments hardly so, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles long, curved, slender at the base, the distal portion flattened, truncate apically and toothed, base touching the eye above; gula and sides of the head convex, the former medially foreshortened, as wide as long, anterior margin arcuately concave, posterior margin incised; abdomen ovate, smooth and polished; wings subinfuscate, with a faint fuscous pigmentation; length 2.5 mms.

Described from two females (type and paratype) collected at Malamalama, Oahu, by P. H. Timberlake, July 28th, 1918, on *Kadua acuminata.*

Type: Cat. No. 91, Bishop Museum.

92. *Sierola gracilariae* n.sp.

♀ shining black, the head dull; legs luteous, antennæ brown to fuscous, mandibles reddish apically.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; finely and closely punctate, and hairy. Head a little longer than wide, widest across the eyes, narrowing behind and in front, width between the eyes a little more than the length from eye to vertex; flatly convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ a little longer than the head, pedicel longer than wide, the following segments as wide as long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward shortly on the top of the head; mandibles long, curved, slender at the base, the distal portion flattened, truncate apically and toothed, base touching the eye above; gula and sides of the head flatly convex, the former medially foreshortened, as wide as long, anterior margin arcuately concave, posterior margin incised, depressed along the median line; propodeum very finely rugulose; abdomen shortly ovate, smooth and polished; wings hyaline; length 2 mms.

♂ a little smaller, head shorter, mandibles and first four antennal segments luteous, abdomen bluntly pointed at the apex.

Described from one female and two males (type, allotype and paratype) from Niu, Oahu, reared by O. H. Swezey from the larva of *Gracilaria mabaella*, December 11, 1910.

Type: Cat. No. 92, Bishop Museum.

93. *Sierola incita* n.sp.

♀ dull shining black; legs, antennæ, clypeus and mandibles yellowish brown, the mandibles black at the base and reddish apically.

Head and thorax with a microscopically fine reticulate surface sculpture, very delicate on the thorax; shallowly, closely and somewhat coarsely punctate, the punctuation on the thorax very fine; hairy clothing short and delicate. Head a little wider than the thorax, longer than wide by a half, width between the eyes equalling the length from eye to vertex, length in front of the eyes not great; convex above and beneath, depressed in front; vertical margin straight, temples rounded, eyes flatly convex; antennæ a little longer than the head, all the segments a little longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate apically and toothed, base not quite reaching the eye; gula convex, not much foreshortened, anterior and posterior margins arcuately concave; abdomen ovate, depressed, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.75 mms.

Described from one female (type) collected on the Palolo Hill trail, Oahu, by P. H. Timberlake, April 4, 1916.

Type: Cat. No. 93, Bishop Museum.

94. *Sierola cryptophlebiae* n.sp.

♀ dull shining black; legs and antennæ yellowish brown, mandibles reddish apically.

Head and thorax with a microscopically fine reticulate surface sculpture; fairly closely, finely and shallowly punctate; hairy clothing short and delicate. Head longer than wide by more than a half, width between the eyes a little more than the length from eye to vertex; flat above, depressed in front, convex beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ scarcely longer than the head, pedicel a little longer than wide, the following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula convex, medially foreshortened, as wide as long, closely punctate, median groove effaced, anterior margin arcuately concave, posterior margin incised; abdomen ovate, apically acuminate, smooth and polished; wings hyaline; length 2.5 mms.

Described from six females (type and paratypes). Five ♀♀, including type, from Tantalus, Oahu, reared from the larva of *Cryptophlebia illepida*, by D. T. Fullaway, June 10, 1910. Four of these specimens and one ♀ from S. E. Koolau mountains, collected by J. C. Bridwell in 1913, paratypes.

Type: Cat. No. 94, Bishop Museum.

95. *Sierola polita* n.sp.

♀ dull shining black; legs and antennæ brown, the latter fuscous outwardly, the former basally.

Head and thorax with a microscopically fine reticulate surface sculpture; shallowly, closely and fairly coarsely punctate, and hairy. Head longer than wide by a half, width between the eyes a little more than the length from eye to vertex; flat above, depressed in front, convex beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ not much longer than the head, pedicel longer than wide, following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate apically and toothed, base not quite reaching the eye; gula convex, somewhat foreshortened medially, as wide as long, anterior margin arcuately concave, posterior margin incised, median groove nearly effaced; abdomen ovate, smooth and polished; wings subinfuscate; length 2.25 mms.

Described from two females (type and paratype) collected at Kuliouou, Oahu, by P. H. Timberlake, June 25, 1916.

Type: Cat. No. 95, Bishop Museum.

96. *Sierola lanihuliana* n.sp.

♀ dull shining black; legs and antennæ fuscous, the former yellowish brown outwardly, the latter basally; mandibles reddish brown except at the base.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, much coarser on the head; shallowly, closely and rather coarsely punctate on the head, the punctation finer on the thorax; hairy clothing inconspicuous. Head wider than the thorax, a little longer than wide, width between the eyes a little more than the length from eye to vertex, length in front of the eyes not great; flat above, tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin straight, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, all the segments longer than wide, antennal fossæ deep; clypeus short, carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward shortly on the top of the head; mandibles stout, curved, concavo-convex, truncate apically and toothed, base not quite reaching the eye, lower angle protuberant; gula convex, medially foreshortened, wider than long, anterior margin arcuately concave, posterior margin incised; propodeum finely rugulose; abdomen ovate, apically acuminate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.75 mms.

Described from one female (type) collected at Lanihuli, Oahu, by P. H. Timberlake, September 3, 1918.

Type: Cat. No. 96. Bishop Museum.

97. *Sierola nigrita* n.sp.

♀ dull shining black; legs and antennæ fuscous, the latter more or less brown at the base, the former brown outwardly; mandibles reddish apically.

Head and thorax with a microscopically fine reticulate surface sculpture; fairly closely, finely and shallowly punctate; hairy clothing short and inconspicuous. Head a little longer than wide, width between the eyes a little more than the length from eye to vertex, length in front of the eyes not great; convex above and beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ no longer than the head, the pedicel longer than wide, the following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward shortly on the top of the head; mandibles stout, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula convex, somewhat foreshortened medially, as wide as long, with a shallow depression along the median line, anterior margin arcuately concave, posterior margin incised; abdomen ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.5 mms.

Described from one female (type) collected at Opaeula, Oahu, by D. T. Fullaway, March 30, 1913.

Type: Cat. No. 97, Bishop Museum.

98. *Sierola hillebrandi* n.sp.

♀ dull shining black; legs luteous, antennæ yellowish brown, fuscous outwardly.

Head and thorax with a microscopically fine reticulate surface sculpture; finely, shallowly and closely punctate; hairy clothing inconspicuous. Head a little longer than wide, width between the eyes a little more than the length from eye to vertex; convex above and beneath, depressed in front; vertical margin straight, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, segments of the flagellum with the exception of the third, longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate apically and toothed, base not quite reaching the eye; gula convex, medially foreshortened, as wide as long, anterior margin arcuately concave, posterior margin incised, median groove effaced; propodeum finely rugulose; abdomen ovate, apically acuminate, smooth and polished; wings infuscate; length 3 mms.

Described from one female (type) collected at Hillebrand's Glen, Oahu, by O. H. Swezey, November 17, 1912.

Type: Cat. No. 98, Bishop Museum.

99. *Sierola affinis* n.sp.

♀ dull shining black; legs and antennæ basally luteous, the latter fuscous apically and the middle and hind femora infuscate.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, coarser on the head; coarsely, shallowly and closely punctate, and hairy. Head wider than the thorax, a little longer than wide, width between the eyes a little more than the length from eye to vertex, length in front of the eyes not great; convex above and beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ a little longer than the head, pedicel twice as long as wide, first, second and third funicle segments longer than wide, following segments as wide as or wider than long, antennal fossæ deep; clypeus short and flat, longitudinally carinate down the middle, apically depressed and projecting very slightly in front of the anterior margin of the head, sloping a little at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate apically and toothed, base almost touching the eye above; gula convex, medially foreshortened, as wide as long, anterior margin arcuately concave, posterior margin incised; propodeum finely rugulose; abdomen elongate ovate, smooth and polished; wings subinfuscate; length 2.5 mms.

Described from one female (type) collected at Kuliouou, Oahu, by P. H. Timberlake, December 12, 1918.

Type: Cat. No. 99, Bishop Museum.

100. *Sierola opogonae* n.sp.

♀ dull black, opaque; legs and antennæ luteous, the latter fuscous apically, the former basally.

Head and thorax to the propodeum with a microscopically fine and close reticulate surface sculpture, a little coarser on the head; finely, closely and shallowly punctate; hairy clothing long, delicate and ample. Head a little longer than wide, widest across the eyes, narrowing behind and in front, width between the eyes somewhat more than the length from eye to vertex; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ a little longer than the head, pedicel less than twice as long as wide, the following segments as long as or a little longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, concavo-convex, truncate apically and toothed, base not quite reaching the eye; gula convex, medially foreshortened, as wide as long, anterior margin arcuately concave, posterior margin deeply incised, median groove nearly effaced; propodeum finely rugulose, flat dorsally; abdomen short ovate, smooth and polished; wings hyaline; length 2.25 mms.

♂ smaller, head a little shorter, mandibles luteous, abdomen bluntly pointed at the apex.

Described from two females and one male (type, allotype and paratype) from Tantalus mountain, Oahu, reared by J. C. Bridwell from *Opogona* larva on *Clermontia.* The parasitized larva was collected May 26, 1918, cocoons were formed by May 27, adults appeared June 5.

Type: Cat. No. 100, Bishop Museum.

101. *Sierola luteipes* n.sp.

♀ dull black, opaque; legs and antennæ basally luteous, the latter fuscous apically; mandibles fuscous except at the base; abdomen somewhat piceous.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, a little coarser on the head; finely, shallowly and somewhat remotely and sparsely punctate; hairy clothing inconspicuous. Head a little longer than wide, width between the eyes a little more than the length from eye to vertex, length in front of the eyes not great; flatly convex above, depressed in front, a little tumid beneath, the greatest depth beneath the eye; vertical margin straight, temples rounded, eyes flatly convex; antennæ a little longer than the head, pedicel and first funicle segment a little longer than wide, the following segments as wide as long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward shortly on the top of the head; mandibles fairly slender, curved, truncate apically and toothed, base not quite reaching the eye, lower angle protuberant; gula convex, medially foreshortened, wider than long, anterior margin arcuately concave, posterior margin incised; propodeum rugose, convex above; abdomen ovate, apically acuminate, smooth and polished; wings hyaline; length 2.25 mms.

Described from one female (type) collected in Palolo Valley, Oahu, by O. H. Swezey, September 3, 1906.

Type: Cat. No. 101, Bishop Museum.

102. *Sierola pilifera* n.sp.

♀ dull black, opaque; legs brown, scape and pedicel of antennæ luteous, the following segments fuscous; mandibles reddish brown except at base.

Head and thorax to the propodeum with a microscopically fine and close reticulate surface sculpture, a little coarser on the head; very finely, shallowly and closely punctate; hairy clothing long, delicate and ample. Head somewhat longer than wide, widest across the eyes, narrowing behind and in front, width between the eyes somewhat more than the length from eye to vertex; flatly convex above, depressed in front, convex beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base almost touching the eye above, lower angle protuberant; gula flatly convex, medially foreshortened, as wide as long, anterior margin arcuately concave, posterior margin incised, sides of the head flat and polished in the middle; propodeum finely rugulose; abdomen elongate ovate, apically acuminate, smooth and polished; wings subinfuscate, nearly hyaline; length 2.75 mms.

Described from one female (type) collected at Makaha, Oahu, by W. M. Giffard, November 5, 1905.

Type: Cat. No. 102, Bishop Museum.

103. *Sierola sericea* n.sp.

♀ dull black, opaque; legs and antennæ basally brown, the front coxæ and the antennæ outwardly fuscous; mandibles reddish apically.

Head and thorax to the propodeum with a microscopically fine and close reticulate surface sculpture, a little coarser on the head; very finely, shallowly and closely punctate; hairy clothing long, delicate and rather thick, that on the antennæ sericeous. Head longer than wide by a half, width between the eyes a little more than the length from eye to vertex; flatly convex above, depressed in front, a little tumid beneath, the greatest depth beneath the eye; vertical margin straight, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, all the segments longer than wide, pedicel twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles slender, curved, truncate apically and toothed, base touching the eye above, lower angle protuberant; gula and sides of the head flat, the former longer than wide, narrowing behind, anterior margin arcuately concave, posterior margin deeply incised; propodeum finely rugulose; abdomen elliptical, smooth and polished; wings subinfuscate, with a yellowish brown pigmentation; length 2.75 mms.

Described from one female (type) collected at Olinda, Maui, 4200 ft. elevation, by Giffard and Fullaway, May 13, 1918.

Type: Cat. No. 103, Bishop Museum.

104. *Sierola robusta* n.sp.

♀ dull black, opaque; legs and antennæ yellowish brown, the femora infuscate; mandibles reddish apically.

Head and thorax to the propodeum with a microscopically fine and close reticulate surface sculpture, a little coarser on the head; finely, shallowly and closely punctate; hairy clothing long, delicate and ample. Head longer than wide by the length in front of the eyes, widest across the eyes, narrowing behind and in front, width between the eyes somewhat more than the length from eye to vertex; convex above, depressed in front, tumid beneath, the greatest depth beneath the eye; vertical margin slightly concave, temples rounded, eyes flatly convex; antennæ broken, basal segments all longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles slender, curved, concavo-convex, truncate apically and toothed, base not reaching the eye; gula anteriorly and sides of the head flat, the former medially foreshortened, longer than wide, narrowing posteriorly, where it is more convex, anterior margin almost straight, posterior margin incised, median groove effaced; propodeum finely rugulose; abdomen ovate, apically acuminate, smooth and polished; wings subinfuscate; length 3 mms.

Described from one female (type) collected at Opaeula, Oahu, by O. H. Swezey, March 30, 1913.

Type: Cat. No. 104, Bishop Museum.

105. *Sierola setosa* n.sp.

♀ dull black, the head opaque; legs and antennæ brown, the femora a little infuscate; mandibles reddish brown except at the base.

Head and thorax with a microscopically fine and close reticulate surface sculpture, coarser on the head; coarsely, shallowly and fairly closely punctate, the punctuation on the thorax finer; clothed with stiff silvery white hairs. Head a little longer than wide, widest across the eyes, narrowing behind and in front, width between the eyes a little more than the length from eye to vertex, length in front of the eye not great; flatly convex above, depressed in front, a little tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin straight, temples rounded, eyes convex; antennæ a little longer than the head, all the segments longer than wide, pedicel nearly twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles stout, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula and sides of the head convex, the former medially foreshortened, wider than long, anterior margin arcuately concave, posterior margin incised; abdomen elongate ovate, smooth and polished; wings subinfuscate, with a faint fuscous pigmentation; length 3 mms.

Described from one female (type) collected on the Palolo Hill trail, Oahu, by P. H. Timberlake, April 9, 1916.

Type: Cat. No. 105, Bishop Museum.

106. *Sierola batrachedrae* n.sp.

♀ shining brown to fuscous, prothorax and abdomen basally yellowish brown; legs, antennæ and mandibles luteous.

Head and thorax with a microscopically fine reticulate surface sculpture; finely, shallowly and somewhat remotely punctate; hairy clothing short and inconspicuous. Head nearly as broad as long, width between the eyes a little more than the length from eye to vertex, length in front of the eyes not great; flatly convex above, depressed in front, tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin slightly convex, temples rounded, eyes flatly convex; antennæ not much longer than the head, pedicel a little longer than wide, the following segments all as wide as or wider than long, antennal fossæ deep; clypeus short, carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base touching the eye above, lower lobe protuberant; gula and sides of the head flat, the former medially foreshortened, a little longer than wide, narrowing behind, anterior margin arcuately concave, posterior margin incised; abdomen elliptical, apically acuminate, smooth and polished; wings hyaline; length 1.5 mms.

♂ smaller; antennæ more slender, the six last segments longer than wide; abdomen bluntly pointed at apex.

Described from a series of males and females (type, allotype and paratypes) from Palolo Ridge, Oahu, reared by O. H. Swezey, September 4, 1911.

from the larva of a species of *Batrachedra* infesting a fern (*Acrostichum* sp.).

Type: Cat. No. 106, Bishop Museum.

107. *Sierola similaris* n.sp.

♀ shining black, a little dull on the head; prothorax, legs, antennæ and mandibles yellowish brown.

Head and thorax with a microscopically fine reticulate surface sculpture, a little coarser on the head; finely, shallowly, fairly closely punctate, and hairy. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes considerably more than the length from eye to vertex, length in front of the eyes not great; flat above, depressed in front, tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, pedicel more than twice as long as wide, antennal fossæ deep; clypeus short, carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward shortly on the top of the head; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula convex, not much foreshortened, anterior and posterior margins arcuately concave; abdomen ovate, smooth and polished; wings subinfuscate; length 2.25 mms.

Described from one female (type) collected at Waimano, Oahu, by O. H. Swezey, January 5, 1913.

Type: Cat. No. 107, Bishop Museum.

108. *Sierola fossulata* n.sp.

♀ shining black; mandibles, coxæ, femora, and flagellum of the antennæ fuscous, trochanters, tibiæ, tarsi and scape of the antennæ yellowish brown.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; coarsely, shallowly and fairly closely punctate; clothed with short, fairly stiff white hairs. Head wider than the thorax, as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes nearly twice the length from eye to vertex; convex above, tumid beneath, the depth beneath the eye equal to the length behind the eye; vertical margin slightly convex, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, the pedicel twice as long as wide, antennal fossæ deep; clypeus more or less convex, indistinctly carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, sloping at the sides, the carina extending backward shortly on the top of the head; mandibles slender, bent and twisted at the middle, the distal portion flattened, truncate apically and toothed, base not reaching the eye; gula and sides of the head flat, the former medially foreshortened, wider than long, median line with a deep sulcus posteriorly, anterior margin arcuately concave, posterior margin incised, the lower lobe of the base of the mandibles deeply notching the anterior margin at the side; propodeum rugose and dull; abdomen ovate, apically acuminate, smooth and polished; wings hyaline; length 2.75 mms.

Described from one female (type) collected on the Kaumuohona Trail, Oahu, by P. H. Timberlake, September 9, 1917.

Type: Cat. No. 108, Bishop Museum.

109. *Sierola fusca* n.sp.

♀ shining black, legs and antennæ fuscous, coxæ and femora nearly black, trochanters, tibiæ and tarsi sordid yellowish brown.

Head and thorax to the propodeum with a microscopically fine and shallow reticulate surface sculpture; coarsely and rather remotely punctate and hairy. Head nearly as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes greater than the length from eye to vertex; flat above, convex beneath, the greatest depth beneath the posterior end of the eye; vertical margin slightly convex, temples rounded, eyes convex; antennæ reaching the scutellum, all the segments twice as long as wide, antennal fossæ deep; clypeus reduced by erosion from the sides to a thin, carinate ridge, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base not reaching the eye above; gula flatly convex, a little foreshortened medially, anterior and posterior margins arcuately concave; propodeum rugulose; abdomen elongate ovate, smooth and polished; wings subinfuscate, with a faint fuscous pigmentation; length 2.75 mms.

Described from one female (type) collected on Kaala Mountain, Oahu, 1500-2500 ft. elevation, by P. H. Timberlake, July 9, 1916.

Type: Cat. No. 109, Bishop Museum.

110. *Sierola croccipes* n.sp.

♀ shining black; legs, mandibles except at the base, and antennæ basally croceous, the antennæ outwardly fuscous.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; finely, shallowly and somewhat remotely punctate; clothed with short, stiff silver gray hairs. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes greater by a half than the length from eye to vertex; flat above, tumid beneath, depth beneath the posterior end of the eye equalling the length from eye to vertex; vertical margin straight, temples rounded, eyes convex; antennæ almost reaching the scutellum, all the segments considerably longer than wide, antennal fossæ deep; clypeus short, carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, sloping at the sides, the carina extending backward shortly on the top of the head; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula and sides of the head flat, the former not much foreshortened, nearly as long as wide, narrowing behind, anterior and posterior margins arcuately concave; propodeum rugulose; abdomen elongate ovate, apically acuminate, smooth and polished;

wings subinfuscate, with a faint yellowish brown pigmentation, radial cell incomplete; length 2.75 mms.

Described from one female (type) collected at Kilauea, Hawaii, 29 miles, by W. M. Giffard, January, 1915.

Type: Cat. No. 110, Bishop Museum.

111. *Sierola puuwaawaa* n.sp.

♀ shining black, legs and antennæ basally yellowish brown, the latter fuscous outwardly from the scape.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, very delicate on the thorax; coarsely and somewhat remotely punctate; hairy clothing short and inconspicuous. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes greater by a half than the length from eye to vertex; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments considerably longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles fairly slender, curved, truncate apically and toothed, base not quite reaching the eye above, lower lobe protuberant; gula and sides of the head convex, the former medially foreshortened, as wide as long, anterior margin nearly straight, posterior margin incised; propodeum rugulose, a triangular area at the base smooth; abdomen elongate ovate, apically acuminate, smooth and polished; wings subinfuscate, with a faint fuscous pigmentation; length 2.75 mms.

Described from two females (type and paratype) collected at Puuwaawaa, N. Kona, Hawaii, 3700-3800 ft. elevation, by W. M. Giffard, August 24, 1917. Type numbered 14.

Type: Cat. No. 111, Bishop Museum.

112. *Sierola minuscula* n.sp.

♀ shining black, legs and antennæ luteous to yellowish brown, mandibles reddish brown.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; fairly coarsely and remotely punctate and hairy. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes a little more than the length from eye to vertex; convex above and beneath; vertical margin straight, temples rounded, eyes convex; antennæ a little longer than the head, pedicel nearly twice as long as wide, following segments all a little longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, sloping at the sides, the carina extending backward shortly on the top of the head; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula convex, nearly flat, a little wider than long, anterior margin straight, posterior margin incised, median groove nearly effaced; propodeum finely rugulose; abdomen short ovate, smooth and polished; wings hyaline; length 1.75 mms.

Described from one female (type) collected on Kaala, Waianae Mountains, Oahu, by D. T. Fullaway, August 11, 1912.

Type: Cat. No. 112, Bishop Museum.

113. *Sierola anemophila* n.sp.

♀ shining black, antennæ and femora fuscous, trochanters, tibiæ and tarsi yellowish brown.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; finely, shallowly and remotely punctate; hairy clothing delicate and grayish white. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes twice the length from eye to vertex; flat on top, depressed in front, tumid beneath; vertical margin slightly convex, temples rounded, eyes convex; antennæ longer than the head, all the segments longer than wide the pedicel nearly twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides; mandibles slender, curved, truncate apically and toothed, base not quite reaching the eye above, lower lobe protuberant; gula and sides of the head flatly convex, the latter polished, the former somewhat foreshortened medially, as wide as long, anterior margin nearly straight, posterior margin incised; propodeum finely rugulose; abdomen short ovate, apically acuminate, smooth and polished; wings subinfuscate, with a faint fuscous pigmentation; length 2.75 mms.

Described from one female (type) collected at the Nuuanu Pali, Oahu, by D. T. Fullaway, April 1, 1917.

Type: Cat. No. 113, Bishop Museum.

114. *Sierola brunneipennis* n.sp.

♀ shining black, antennæ and legs from the femora outwardly brown to fuscous.

Head and thorax with a microscopically fine and shallow reticulate surface sculpture; finely and somewhat remotely punctate, hairy clothing short and inconspicuous. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes nearly twice the length from eye to vertex; flatly convex above, depressed in front, a little tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin straight, temples rounded, eyes flatly convex; antennæ not much longer than the head, all the segments as wide as long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles slender, curved, truncate apically and toothed, base touching the eye above, lower lobe slightly protuberant; sides of the head and the gula in front flat, the latter wider than long, narrowing behind, where it is convex, with a slight depression along the median line, anterior margin arcuately concave, posterior margin incised; abdomen elongate ovate, smooth and shining; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.25 mms.

Described from one female (type) collected on Kaala Mountain, Oahu, by O. H. Swezey September 7, 1913.

Type: Cat. No. 114, Bishop Museum.

115. *Sierola mandibulata* n.sp.

♀ particolored, the head and posterior half of the thorax shining black, prothorax, mesoscutum and abdomen yellowish brown; legs luteous, mandibles and antennæ yellowish brown, the former black at the base, the latter fuscous outwardly.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, a little coarse, but shallow, on the head; coarsely, shallowly and fairly closely punctate; clothed with short, stiff white hairs. Head nearly as wide as long, width between the eyes greater than the length from eye to vertex, length in front of the eyes not great; convex above, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments with the exception of the second and third of the funicle longer than wide, pedicel and first funicular segment nearly twice as long as wide, antennal fossæ deep; clypeus short, carinate, apically depressed and projecting slightly in front of the anterior margin of the head, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles stout, bent and twisted at the middle, the distal portion flattened, truncate apically and toothed, base touching the eye above; gula and sides of the head flatly convex, the former a little foreshortened medially, as wide as long, anterior margin arcuately concave, posterior margin incised; propodeum finely rugulose; abdomen elongate ovate, smooth and polished; wings subinfuscate, with a faint fuscous pigmentation; length 2.75 mms.

Described from one female (type) collected on Niu Ridge, Oahu, by P. H. Timberlake, February 10, 1918.

Type: Cat. No. 115, Bishop Museum.

116. *Sierola tuberculata* n.sp.

♀ shining black, the legs and antennæ yellowish brown to fuscous.

Head and thorax to the propodeum with a microscopically fine and shallow reticulate surface sculpture; fairly coarsely, shallowly and remotely punctate; clothed with fairly long silvery gray hairs. Head as wide as long, width between the eyes twice the length from eye to vertex; convex above, tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin straight, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, all the segments longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, sloping at the sides, the carina extending backward shortly on the top of the head; mandibles fairly stout, bent at outer third, truncate apically and toothed, base touching the eye above, lower lobe protuberant; gula and sides of the head flat, the former medially foreshortened, wider than long, narrowing behind, where it is divided into two lobes by a deep median sulcus, anterior margin arcuately concave, posterior margin incised; propodeum rugulose;

abdomen short ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 3 mms.

Described from one female (type) collected in the Waianae Mountains, Oahu, by D. T. Fullaway, March 5, 1911.

Type: Cat. No. 116, Bishop Museum.

117. *Sierola nigra* n.sp.

♀ shining black, the legs fuscous basally, tibiæ, tarsi and antennæ yellowish brown, mandibles reddish brown.

Head and thorax to the propodeum with a microscopically fine and shallow reticulate surface sculpture; extremely finely and fairly closely punctate; clothed with short, delicate grayish hairs. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes greater by a half than the length from eye to vertex; flatly convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ nearly reaching the scutellum, pedicel and first funicle segment twice as long as wide, following segments all a little longer than wide, antennal fossæ deep; clypeus short, carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, sloping at the sides, the carina extending backward shortly on the top of the head; mandibles fairly stout, curved, concavo-convex, truncate apically and toothed, base not quite reaching the eye above, lower lobe slightly protuberant; gula and sides of the head flat, the former medially foreshortened, wider than long, narrowing behind, where there is a slight depression along the median line, anterior margin arcuately concave, posterior margin incised; propodeum rugulose; abdomen short ovate, apically acuminate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2 mms.

Described from one female (type) collected on Kaala Mountain, Oahu, by O. H. Swezey, August 11, 1912.

Type: Cat. No. 117, Bishop Museum.

118. *Sierola manoa* n.sp.

♀ shining black, the head somewhat dull; legs reddish brown, mandibles and antennæ yellowish brown, the former black at the base, the latter fuscous outwardly.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; fairly coarsely and remotely punctate, and hairy. Head nearly as wide as long, width between the eyes about twice the length from eye to vertex; flat above, depressed in front, convex beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, pedicel twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles fairly stout, curved, truncate apically and toothed, base not quite reaching the eye above, lower lobe protuberant; gula and sides of the head flat, the former medially foreshortened, wider than long, narrowing behind where there is a slight depression along the median line, anterior margin arcuately concave, posterior margin incised; propodeum rugulose; abdomen elongate ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 3 mms.

Described from one female (type) collected on Manoa Ridge, Oahu, by D. T. Fullaway, February 13, 1917.

Type: Cat. No. 118, Bishop Museum.

119. *Sierola lata* n.sp.

♀ shining black, the legs and antennæ brown to fuscous, femora fuscous.

Head and thorax to the propodeum with a microscopically fine and delicate reticulate surface sculpture; fairly closely and finely punctate, and hairy. Head wider than the thorax, as wide as long, width between the eyes greater by a half than the length from eye to vertex, length in front of the eyes not great; flatly convex above, convex beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ a little longer than the head, pedicel longer than wide, the following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate apically and toothed, base not quite reaching the eye; gula flatly convex, a little foreshortened medially, wider than long, with a depression along the median line, anterior margin arcuately concave, posterior margin incised; propodeum rugulose, with a smooth triangular area at the base; abdomen elongate ovate, apically acuminate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 3 mms.

Described from one female (type) collected on Olympus Mountain, Oahu, by O. H. Swezey, January 21, 1912.

Type: Cat. No. 119, Bishop Museum.

120. *Sierola fuliginosa* n.sp.

♀ shining black, the legs fuscous basally, yellowish brown from the apex of the femora outwardly, antennæ yellowish brown basally, fuscous apically, mandibles apically reddish.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; fairly coarsely, shallowly and closely punctate, and hairy. Head nearly as wide as long, width between the eyes greater by a half than the length from eye to vertex; flatly convex above, depressed in front, convex beneath; vertical margin slightly convex, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles fairly stout, curved, concavo-convex, truncate apically and toothed, base not reaching the eye; gula and sides of the head flat, the former medially foreshortened, wider than long, anterior margin arcuately concave, posterior margin incised, median groove nearly effaced; propodeum coarsely rugulose; abdomen ovate, smooth and polished; wings subinfuscate; length 3 mms.

Described from one female (type) collected on Mt. Kaala, Oahu, by P. H. Timberlake, July 4, 1916.

Type: Cat. No. 120, Bishop Museum.

121. *Sierola vulcana* n.sp.

♀ shining black, the legs and antennæ fuscous, trochanters, apex of femora, tibiæ and tarsi brown.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; coarsely, shallowly and fairly closely punctate, and hairy. Head nearly as wide as long, width between the eyes twice the length from eye to vertex, length in front of the eyes not great; flat above, depressed in front, convex beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ reaching the scutellum, all the segments twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, truncate apically and toothed, base not reaching the eye above, lower lobe protuberant; gula flatly convex, medially foreshortened, wider than long, anterior margin arcuately concave, posterior margin incised; propodeum finely rugulose; abdomen ovate, apically acuminate, smooth and polished; wings with a yellowish brown pigmentation; length 3 mms.

Described from one female (type) collected at Kilauea, Hawaii, lumber camp, 4000 ft. elevation, by W. M. Giffard, July 19, 1918.

Type: Cat. No. 121, Bishop Museum.

122. *Sierola nigrans* n.sp.

♀ dull shining black, the legs outwardly fuscous.

Head and thorax with a microscopically fine and close reticulate surface sculpture; finely, shallowly and fairly closely punctate, and hairy. Head as wide as long, width between the eyes nearly twice the length from eye to vertex, length in front of the eyes not great; flatly convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the scutellum, all the segments longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base not quite reaching the eye; gula and sides of the head flat, the former medially foreshortened, wider than long, narrowing behind, anterior margin arcuately concave, posterior margin incised, median groove nearly effaced; abdomen ovate, reticulately sculptured and shining; wings infuscate, with a faint fuscous pigmentation; length 2.75 mms.

Described from one female (type) collected at Kahuku, Kau, Hawaii, 1800 ft. elevation, by W. M. Giffard, January 14, 1919.

Type: Cat. No. 122, Bishop Museum.

123. *Sierola olinda* n.sp.

♀ dull shining black, the head nearly opaque; legs fuscous, tibiæ and tarsi fuscous brown; antennæ yellowish brown basally, fuscous apically.

Head and thorax with a microscopically fine reticulate surface sculpture, very delicate on the thorax, coarser on the head; finely and fairly closely punctate, and hairy. Head nearly as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes considerably more than the length from eye to vertex, length in front of the eyes not great; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, first to fifth funicular segments hardly longer than wide, the following segments a little longer, pedicel nearly twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base not quite reaching the eye; gula and sides of the head flat, the former medially foreshortened, wider than long, anterior margin arcuately concave, posterior margin incised; abdomen ovate, apically acuminate, smooth and polished; wings subinfuscate; length 2.5 mms.

Described from one female (type) collected at Olinda, Maui, 4200 ft. elevation, by Giffard and Fullaway, May 12 and 13, 1918.

Type: Cat. No. 123, Bishop Museum.

124. *Sierola indecora* n.sp.

♀ dull shining black, trochanters, tibiæ and tarsi brown, antennæ fuscous.

Head and thorax with a microscopically fine reticulate surface sculpture, very delicate on the scutellum and propodeum, coarser on the head; coarsely, shallowly and fairly closely punctate, and hairy except on the propodeum. Head nearly as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes twice the length from eye to vertex; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base not quite reaching the eye; gula and sides of the head flat, the former medially foreshortened, wider than long, narrowing behind, anterior margin arcuately concave, posterior margin incised; abdomen short ovate, apically acuminate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.25 mms.

Described from one female (type) collected at Kilauea, Hawaii, 4000 ft. elevation, by W. M. Giffard, October, 1915.

Type: Cat. No. 124, Bishop Museum.

125. *Sierola nubila* n.sp.

♀ dull shining black, trochanters, tibiæ, tarsi and antennæ fuscous.

Head and thorax with a microscopically fine reticulate surface sculpture; fairly closely and finely punctate, and hairy. Head nearly as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes greater by one-half than the length from eye to vertex; convex above, depressed in front, a little tumid beneath, the greatest depth behind the eye; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, pedicel and first funicular segment longer than wide, the following segments hardly so, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles curved, slender, truncate apically and toothed, base touching the eye above; gula and sides of the head flat, the former medially foreshortened, wider than long, narrowing behind, anterior margin straight, posterior margin incised, median groove nearly effaced; abdomen ovate, apically acuminate, smooth and polished; wings subinfuscate, with a very faint fuscous pigmentation; length 2.1 mms.

Described from one female (type) collected at Kilauea, Hawaii, 4000 ft. elevation, by W. M. Giffard, January 11, 1919.

Type: Cat. No. 125, Bishop Museum.

126. *Sierola epagogeana* n.sp.

♀ dull shining black, the legs luteous, antennæ yellowish brown, mandibles brown outwardly.

Thorax with a microscopically fine reticulate surface sculpture, very delicate on the scutellum and propodeum, close and shallow on the mesoscutum and pronotum, coarser on the head; coarsely, shallowly and fairly closely punctate on the head, the punctuation on the thorax much finer; clothed with silvery white hairs. Head nearly as wide as long, widest across the posterior end of the eyes, narrowing behind and in front, width between the eyes twice the length from eye to vertex; convex above, depressed in front, a little tumid beneath; vertical margin slightly convex, temples rounded, eyes convex; antennæ a little longer than the head, all the segments longer than wide, pedicel twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles rather slender, curved, outwardly somewhat flattened, truncate apically and toothed, base not reaching the eye; gula and sides of the head flatly convex, the former medially foreshortened, wider than long, anterior margin arcuately concave, posterior margin incised; propodeum short, posterior face flat; abdomen short ovate, apically acuminate, smooth and polished; wings hyaline; length 2 mms.

Described from one female (type) from Kaumuohona Trail, Oahu, reared by O. H. Swezey from the larva of *Epagoge infaustana*, December 18, 1910.

Type: Cat. No. 126, Bishop Museum.

127. *Sierola abusa* n.sp.

♀ dull shining black, legs, antennæ and outer half of mandibles yellowish brown, somewhat infuscate.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; finely, shallowly and rather closely punctate, and hairy. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes nearly twice the length from eye to vertex, length in front of the eyes not great; convex above, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, the pedicel and first and second funicular segments longer than wide, the following segments as wide as long or nearly so, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula and sides of the head convex, the former medially foreshortened, as wide as long, anterior margin arcuately concave, posterior margin incised; propodeum finely rugulose; abdomen elongate ovate, smooth and polished; wings subinfuscate; length 2.25 mms.

Described from one female (type) collected on Palolo Hill Trail, Oahu, by P. H. Timberlake, April 9, 1916.

Type: Cat. No. 127, Bishop Museum.

128. *Sierola similis* n.sp.

♀ shining black, the head dull; legs and first three segments of antennæ luteous, the antennæ fuscous outwardly, mandibles reddish apically.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, somewhat remotely and shallowly punctate, the sculpture and punctuation of the head coarser than that of the thorax; clothed with silvery white hairs. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes nearly twice the length from eye to vertex, length in front of the eyes not great; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, the pedicel and first funicle segment twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, sloping at the sides, the carina extending backward shortly on the top of the head; mandibles slender, curved, truncate apically and toothed, base not reaching the eye; gula and sides of the head flatly convex, the former medially foreshortened, as long as wide, anterior margin slightly concave, posterior margin incised; propodeum finely rugulose; abdomen short ovate, apically acuminate, smooth and polished; wings hyaline; length 2 mms.

Described from one female (type) collected on Mt. Kaala, Oahu, by O. H. Swezey, August 11, 1912.

Type: Cat. No. 128, Bishop Museum.

129. *Sierola flavipes* n.sp.

♀ shining black, the head, pronotum, mesoscutum posteriorly and the scutellum dull; legs and basal segments of the antennæ flavous.

Head and thorax with a microscopically fine and close reticulate surface sculpture, the mesoscutum anteriorly and the propodeum more delicately sculptured, the former nearly smooth; finely, closely and shallowly punctate; clothed with long silvery white hairs. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes more than twice the length from eye to vertex; convex above, depressed in front, a little tumid beneath, the greatest depth beneath the eye; vertical margin straight, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, all the segments longer than wide, the pedicel twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles fairly slender, curved, truncate apically and toothed, base reaching the eye above; gula and sides of the head flat, the former medially foreshortened, wider than long, narrowing behind, anterior margin nearly straight, posterior margin incised, a shallow sulcus posteriorly on the median line, the furrow nearly effaced in front; abdomen elongate ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 3 mms.

Described from one female (type) collected on Tantalus Mountain, Oahu, elevation 1300 ft., by W. M. Giffard, April 4, 1905.

Type: Cat. No. 129, Bishop Museum.

130. *Sierola amica* n.sp.

♀ shining black, the head dull; legs and antennæ basally yellowish brown, the latter fuscous outwardly.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, very delicate on the thorax, a little coarser on the head; coarsely, shallowly and remotely punctate, the punctuation on the thorax finer; hairy clothing sparse and delicate. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes considerably more than the length from eye to vertex; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ reaching the scutellum, all the segments longer than wide, pedicel and first to third funicular segments twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, sloping at the sides, the carina extending backward shortly on the top of the head; mandibles slender, curved, truncate apically and toothed, base not quite reaching the eye; gula and sides of the head convex, the former not very much foreshortened medially, longer than wide, a slight depression along the median line posteriorly, the groove nearly effaced in front, anterior margin slightly concave, posterior margin incised; propodeum rugulose; abdomen ovate, apically acuminate, smooth and polished; wings subinfuscate, with a very faint yellowish brown pigmentation; length 2.75 mms.

Described from two females (type and paratype) collected on Kaala Mountain, Oahu, by O. H. Swezey, September 7, 1913, and August 11, 1912, respectively.

Type: Cat. No. 130, Bishop Museum.

131. *Sierola quadriceps* n.sp.

♀ dull shining black, legs and antennæ basally yellowish brown, the latter fuscous outwardly.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, coarser on the head; coarsely, shallowly and remotely punctate, the punctuation on the thorax rather fine; hairy clothing short and inconspicuous. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes greater by a half than the length from eye to vertex; flatly convex above, depressed in front, a little tumid beneath; vertical margin slightly convex, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, all the segments longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, sloping at the sides, the carina extending backward shortly on the top of the head; mandibles slender, curved, truncate apically and toothed, base not quite reaching the eye; gula and sides of the head flatly convex, the former medially foreshortened, wider than long, anterior margin nearly straight, posterior margin incised; propodeum finely rugulose; abdomen ovate, smooth and polished; wings subinfuscate; length 2.1 mms.

Described from one female (type) collected at Puuwaawaa, N. Kona, Hawaii, 3700 ft. elevation, by W. M. Giffard, August, 1917.

Type: Cat. No. 131, Bishop Museum.

132. *Sierola williamsi* n.sp.

♀ dull shining black, trochanters, front femora, apex of middle and hind femora, tibiæ, tarsi, antennæ basally and mandibles except at the base yellowish brown, antennæ outwardly fuscous.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, a little coarser on the head than on the thorax; finely, shallowly and remotely punctate; hairy clothing short and inconspicuous. Head as wide as long, width between the eyes greater than the length from eye to vertex, length in front of the eyes not great; flatly convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, all the segments longer than wide, pedicel twice as long as wide, antennal fossæ deep; clypeus short, carinate, apically depressed, almost perpendicular, and projecting slightly in front of the anterior margin of the head, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles fairly stout, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula and sides of the head flatly convex, the former medially foreshortened, as wide as long, a slight depression in the median line posteriorly, anterior margin arcuately concave, posterior margin incised; propodeum rugulose; abdomen depressed, ovate, smooth and polished; wings fuscous; length 2 mms.

Described from one female (type) collected on Alewa Heights Trail, Oahu, by P. H. Timberlake, March 26, 1916.

Type: Cat. No. 132, Bishop Museum.

133. *Sierola kaalensis* n.sp.

♀ dull shining black, the legs, antennæ basally and the mandibles except at the base luteous, the antennæ fuscous outwardly.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, coarser on the head; coarsely and closely punctate, the punctuation on the thorax finer; hairy clothing delicate but fairly long. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes twice the length from eye to vertex; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments considerably longer than wide, pedicel and first funicle segment twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides; mandibles fairly stout, curved, concavo-convex, truncate apically and toothed, base not quite reaching the eye; gula and sides of the head flat, the former medially foreshortened, wider than long, a depression along the median groove posteriorly, anterior margin arcuately concave, posterior margin incised; propodeum finely rugulose; abdomen ovate, smooth and polished; wings hyaline; length 2.75 mms.

Described from one female (type) collected on Kaala Mountain, Oahu, by P. H. Timberlake, July 22, 1917.

Type: Cat. No. 133, Bishop Museum.

134. *Sierola imparata* n.sp.

♀ dull shining black, legs, antennæ basally and the mandibles yellowish brown, antennæ outwardly fuscous.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; finely, shallowly and closely punctate, and hairy. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes twice the length from eye to vertex; convex above, depressed in front, a little tumid beneath; vertical margin slightly convex, temples rounded, eyes convex; antennæ nearly reaching the scutellum, all the segments considerably longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, truncate apically and toothed, base touching the eye above; gula and sides of the head convex, the former medially foreshortened, wider than long, anterior margin nearly straight, posterior margin incised; propodeum rugulose; abdomen ovate, apically acuminate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 3 mms.

Described from one female (type) collected at Kilauea, Hawaii, dry forest, 4000 ft. elevation by W. M. Giffard, August 1, 1911.

Type: Cat. No. 134, Bishop Museum.

135. *Sierola pembertoni* n.sp.

♀ dull shining black, legs and antennal scape brown, antennæ outwardly infuscate.

Head and thorax to the propodeum with a microscopically fine and delicate reticulate surface sculpture; closely, shallowly and finely punctate, and hairy. Head almost as wide as long, width between the eyes greater than the length from eye to vertex; flatly convex above, convex beneath; vertical margin straight, temples rounded, eyes convex; antennæ a little longer than the head, the pedicel twice as long as wide, the following segments hardly longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, sloping at the sides, the carina extending backward shortly on the top of the head; mandibles stout, curved, concavo-convex, truncate apically and toothed, base not quite reaching the eye; gula flat, medially foreshortened, as wide as long, anterior margin arcuately concave, posterior margin incised, sides of the head convex; propodeum very finely rugulose; abdomen ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.25 mms.

Described from one female (type) collected on Tantalus Mountain, Oahu, 1300 ft. elevation, by W. M. Giffard, February 12, 1905.

Type: Cat. No. 135, Bishop Museum.

136. *Sierola lacessita* n.sp.

♀ dull shining black, legs yellowish brown, antennæ yellowish brown to fuscous.

Head and thorax with a microscopically fine reticulate surface sculpture, coarser on the head; coarsely, shallowly and fairly closely punctate, the punctuation finer on the thorax; clothed with silvery white hairs. Head nearly as wide as long, width between the eyes greater than the length from eye to vertex; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles fairly stout, curved, concavo-convex, truncate apically and toothed, base not reaching the eye above, lower lobe protuberant; gula and sides of the head flatly convex, the former medially foreshortened, as wide as long, anterior margin arcuately concave, posterior margin incised, median groove nearly effaced; abdomen elongate ovate, smooth and polished; wings subinfuscate; length 2.5 mms.

Described from one female (type) collected at Lanihuli, Oahu, by P. H. Timberlake, September 3, 1916.

Type: Cat. No. 136, Bishop Museum.

137. *Sierola conspicua* n.sp.

♀ dull shining black, the legs and scape of antennæ brown, antennæ outwardly infuscate.

Head and thorax to the propodeum with a microscopically fine and delicate reticulate surface sculpture; finely, shallowly and fairly closely punctate, and hairy. Head wider than the thorax, nearly as wide as long, width between the eyes greater by a half than the length from eye to vertex; flatly convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments considerably longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, sloping at the sides, the carina extending backward shortly on the top of the head; mandibles stout, curved, concavo-convex, truncate apically and toothed, base not quite reaching the eye; gula and sides of the head convex, the former medially foreshortened, wider than long, anterior margin arcuately concave, posterior margin incised; propodeum very finely rugulose; abdomen a little depressed, ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.25 mms.

Described from one female (type) collected in the Koloa Mountains, Kauai, by O. H. Swezey, August 2, 1908.

Type: Cat. No. 137, Bishop Museum.

138. *Sierola adumbrata* n.sp.

♀ dull shining black, the femora and antennæ outwardly fuscous; trochanters, tibiæ, tarsi and basal joints of antennæ yellowish brown; mandibles red at the apex.

Head and thorax with a microscopically fine reticulate surface sculpture; coarsely, shallowly and somewhat remotely punctate, and hairy. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes twice the length from eye to vertex; flatly convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the middle of the mesoscutum, all the segments considerably longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles stout, curved, concavo-convex, truncate apically and toothed, base not quite reaching the eye; gula and sides of the head flatly convex, the former medially foreshortened, wider than long, slightly depressed along the median line, anterior margin arcuately concave, posterior margin incised; propodeum finely rugulose; abdomen elongate ovate, smooth and polished; wings hyaline; length 2.25 mms.

Described from two females (type and paratype) collected on Kaala Mountain, Oahu, by O. H. Swezey August 11, 1912.

Type: Cat. No. 138, Bishop Museum.

139. *Sierola illingworthi* n.sp.

♀ dull shining black, trochanters, tibiæ, tarsi and antennæ yellowish brown to fuscous.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, a little coarser on the head; finely and fairly closely punctate, and hairy. Head wider than the thorax, nearly as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes twice the length from eye to vertex; flat above, tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments considerably longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles stout, curved, concavo-convex, truncate apically and toothed, base not reaching the eye; gula flat, medially foreshortened, wider than long, narrowing posteriorly where there is a slight depression along the median line, anterior margin nearly straight, posterior margin incised, sides of the head convex; propodeum rugulose; abdomen elliptical and somewhat depressed, apically acuminate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 3 mms.

Described from one female (type) collected on Kau, Hawaii, a-a flows, elevation 3600 ft., by W. M. Giffard, July 18, 1918.

Type: Cat. No. 139, Bishop Museum.

140. *Sierola nemorensis* n.sp.

♀ dull shining black, legs and antennæ yellowish brown to fuscous.

Head and thorax with a microscopically fine reticulate surface sculpture, very delicate on the thorax, especially on the scutellum and propodeum, coarser on the head; fairly closely and coarsely punctate, and hairy. Head nearly as wide as long, width between the eyes considerably more than the length from eye to vertex; flatly convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ a little longer than the head, pedicel longer than wide, the following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, truncate apically and toothed, base not quite reaching the eye; gula and sides of the head convex, the former medially foreshortened, wider than long, median groove nearly effaced, anterior and posterior margins arcuately concave; abdomen ovate, smooth and polished; wings subinfuscate, with a faint fuscous pigmentation; length 2.75 mms.

Described from two females (type and paratype) collected on Hawaii by Koebele.

Type: Cat. No. 140, Bishop Museum.

141. *Sierola vetusta* n.sp.

♀ dull shining black, trochanters, tibiæ, tarsi and antennæ basally yellowish brown, coxæ, femora and antennæ outwardly fuscous.

Head and thorax with a microscopically fine and close reticulate surface sculpture; finely, shallowly and closely punctate; hairy clothing long and delicate. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes greater than the length from eye to vertex; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, pedicel longer than wide, the following segments hardly so, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles fairly stout, curved, truncate apically and toothed, base touching the eye above; gula convex, medially foreshortened, wider than long, anterior margin arcuately concave, posterior margin incised, sides of the head flat; abdomen ovate, smooth and polished; wings subinfuscate, with a faint fuscous pigmentation; length 2 mms.

Described from one female (type) collected on Maui by Koebele.

Type: Cat. No. 141, Bishop Museum.

142. *Sierola kalihiensis* n.sp.

♀ dull shining black, trochanters, tibiæ, tarsi and base of antennæ brown, antennæ distally fuscous.

Head and thorax with a microscopically fine reticulate surface sculpture, shallow throughout, very delicate on the propodeum, coarser on the head; coarsely and somewhat remotely punctate, the punctuation of the thorax finer; hairy clothing rather short and delicate. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes greater by a half than the length from eye to vertex; convex above, depressed in front, a little tumid beneath; vertical margin slightly convex, temples rounded, eyes convex; antennæ nearly reaching the scutellum, all the segments longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, bent in the middle, outer half concavo-convex, a little flattened dorso-ventrally, base touching the eye above; gula and sides of the head convex, the former medially foreshortened, twice as wide as long, anterior margin arcuately concave, posterior margin incised; abdomen ovate, smooth and polished; wings subinfuscate, with a faint fuscous pigmentation; length 2.25 mms.

Described from one female (type) collected in Kalihi Valley, Oahu, by P. H. Timberlake, March 11, 1917, on *Suttonia lassertiana.*

Type: Cat. No. 142, Bishop Museum.

143. *Sierola aucta* n.sp.

Plate XVI, Figure 7.

♀ unusually large and thickset; dull shining black, antennæ fuscous, trochanters, tibiæ and tarsi yellowish brown.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; finely, shallowly and fairly closely punctate; hairy clothing short and inconspicuous. Head wider than the thorax, longer than wide by more than a half, width between the eyes not much greater than the length from eye to vertex, which is considerably more than the length in front of the eyes; flatly convex above, a little tumid beneath; vertical margin slightly concave, temples rounded, eyes flatly convex; antennæ reaching the mesoscutum, all the segments considerably longer than wide, antennal fossæ deep; clypeus nearly flat, indistinctly carinate, hardly projecting in front of the anterior margin of the head, sloping at the sides; mandibles stout, curved, concavo-convex, somewhat flattened outwardly, truncate apically and toothed, base not reaching the eye; gula and sides of the head convex, the former not much foreshortened, as long as wide, anterior margin nearly straight, deeply notched at the sides by the base of the mandibles, posterior margin incised; propodeum finely rugulose; abdomen short ovate, apically acuminate, smooth and polished; wings with a yellowish brown pigmentation; length 4 mms.

Described from two females (type and paratype). Type (numbered 11) from Puuwaawaa, N. Kona, 3800 ft. elevation, collected by W. M. Giffard, August 24, 1917. Second specimen from Kilauea, Hawaii, collected by D. T. Fullaway, November 19, 1913, paratype.

Type: Cat. No. 143, Bishop Museum.

144. *Sierola breviceps* n.sp.

♀ unusually long; dull shining black, trochanters, tibiæ, tarsi and antennæ basally brown, antennæ fuscous outwardly.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, coarsely, shallowly and fairly closely punctate, the sculpture and punctuation coarser on the head and pronotum than on the mesonotum and scutellum; hairy clothing short and delicate. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes more than twice the length from eye to vertex; convex above, depressed in front, tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments considerably longer than wide, antennal fossæ deep; clypeus carinate, apically depressed, hardly projecting in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate apically and toothed, base not quite reaching the eye; gula flatly convex, medially foreshortened, width twice the length, median furrow nearly effaced, anterior margin arcuately concave, deeply notched at the sides by the base of the mandibles, posterior margin incised; propodeum finely rugulose; abdomen elliptical, smooth and polished; wings subinfuscate, with a very faint yellowish brown pigmentation; length 3.5 mms.

Described from one female (type) collected in Palolo Valley, Oahu, by D. T. Fullaway, September 8, 1912.

Type: Cat. No. 144, Bishop Museum.

145. *Sierola bridwelli* n.sp.

♀ unusually long; shining black, legs and antennæ yellowish brown to fuscous.

Head and thorax to the propodeum with a microscopically fine and delicate reticulate surface sculpture; fairly closely and coarsely punctate, the punctuation finer on the thorax; hairy clothing short and inconspicuous. Head longer than wide, width between the eyes more than the length from eye to vertex, length in front of the eyes not great; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ not much longer than the head, pedicel and first funicle segment a little longer than wide, the following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed, hardly projecting in front of the anterior margin of the head, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate apically and toothed, base not quite reaching the eye; gula and sides of the head flatly convex, the former medially foreshortened, as wide as long, narrowing behind, median furrow nearly effaced, anterior margin almost straight, deeply notched at the sides by the base of the mandibles, posterior margin incised; propodeum finely rugulose; abdomen ovate, apically acuminate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 3.5 mms.

Described from two females (type and paratype) collected in the S. E. Koolau Mountains, Oahu, by J. C. Bridwell, 1916.

Type: Cat. No. 145, Bishop Museum.

146. *Sierola depressa* n.sp.

Plate XVI, Figure 8.

Depressed to an extreme degree; shining black, the legs basally and the antennæ fuscous, tibiæ and tarsi yellowish brown.

Head and thorax with a microscopically fine and delicate reticulate surface sculpture; finely, shallowly and fairly closely punctate; clothed with short, fine, silvery white hairs. Head wider than the thorax, longer than wide by a half, length from eye to vertex equalling the width between the eyes; flat above and beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ longer than the head, all the segments longer than wide, antennal fossæ deep; clypeus short, carinate, apically depressed, hardly projecting in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula flat, hardly foreshortened, longer than wide, median groove nearly effaced, anterior margin straight, posterior margin arcuately concave; pronotum elongate; abdomen broken; wings hyaline; length 2 mms.

Described from one example (type) collected on Kaala Mountain, Oahu, by O. H. Swezey, September 1, 1913.

Type: Cat. No. 146, Bishop Museum.

147. *Sierola philodoriae* n.sp.

♀ somewhat depressed; dull shining black, legs luteous, antennæ and mandibles brown.

Head and thorax with a microscopically fine reticulate surface sculpture; coarsely, shallowly, somewhat remotely punctate, and hairy. Head longer than wide by more than a half, length from eye to vertex equalling the width between the eyes, length in front of the eyes not great; convex above, depressed in front, flat beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, antennal fossæ deep; clypeus short, carinate, apically depressed, almost perpendicular, hardly projecting in front of the anterior margin of the head; mandibles fairly stout, curved, somewhat flattened outwardly, truncate apically and toothed, base touching the eye above; gula flat, not much foreshortened, longer than wide, anterior margin arcuately concave, posterior margin incised; abdomen ovate, apically acuminate, smooth and polished; wings hyaline; length 1.5 mms.

Described from four females (type and paratypes). Three specimens, including type, from Olympus Mountain, Oahu, reared from larva of *Philodoria splendida,* by O. H. Swezey, January 30, 1913. Two specimens in this series and one collected in the S. E. Koolau Mountains, Oahu, by J. C. Bridwell, 1916, paratypes.

Type: Cat. No. 147, Bishop Museum.

148. *Sierola planiceps* n.sp.

♀ depressed; shining black, the legs, antennæ and mandibles, except at the base, flavous.

Head and thorax with a microscopically fine and delicate reticulate surface sculpture; finely, shallowly and somewhat remotely punctate; hairy clothing short and inconspicuous. Head longer than wide, length from eye to vertex equalling the width between the eyes, length in front of the eyes not great; flat above, flatly convex beneath; vertical margin slightly concave, temples rounded, eyes convex; antennæ a little longer than the head, all the segments longer than wide, pedicel twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed, hardly projecting in front of the anterior margin of the head, declivous at the sides; mandibles slender, curved, concavo-convex, flattened outwardly, truncate apically and toothed, base touching the eye above; gula flat, very little foreshortened medially, longer than wide, median groove nearly effaced, anterior margin arcuately concave, posterior margin incised; abdomen short ovate, smooth and polished or nearly so; wings with a yellowish brown pigmentation; length 2 mms.

Described from four females (type and paratypes). Type from Nuuanu Valley, Oahu, collected by D. T. Fullaway, March 4, 1912. Two specimens collected in the S. E. Koolau Mountains, Oahu, by J. C. Bridwell, 1913, and one collected on Kaumuohona, by P. H. Timberlake, June 4, 1916, paratypes.

Type: Cat. No. 148, Bishop Museum.

149. *Sierola holomelaena* n.sp.

♀ depressed; shining black, the head a little dull, legs and antennæ fuscous.

Head and thorax to the propodeum with a microscopically fine and delicate reticulate surface sculpture; finely, shallowly and somewhat remotely punctate; hairy clothing short and delicate. Head longer than wide, width between the eyes greater than the length from eye to vertex, length in front of the eyes not great; flat above, flatly convex beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ longer than the head, all the segments a little longer than wide, antennal fossæ deep; clypeus carinate, apically depressed, not projecting in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula flat, not much foreshortened medially, anterior and posterior margins arcuately concave; propodeum very finely rugulose; abdomen ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.75 mms.

Described from one female (type) collected at Kilauea, Hawaii, 4000 ft. elevation, by Giffard and Muir, January 14, 1917.

Type: Cat. No. 149, Bishop Museum.

150. *Sierola hirticeps* n.sp.

♀ a little slender; dull shining black, coxæ and femora fuscous to black, trochanters, tibiæ, tarsi and antennæ basally yellowish brown, antennæ apically fuscous.

Head and thorax to the propodeum with a microscopically fine and close reticulate surface sculpture; coarsely, shallowly and closely punctate; thickly clothed with long silver-gray hairs. Head nearly twice as long as wide, length from eye to vertex equalling the width between the eyes; flatly convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ a little longer than the head, pedicel nearly twice as long as wide, the following segments as wide as long or nearly so, antennal fossæ deep; clypeus carinate, apically depressed, hardly projecting in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula and sides of the head flat, the former foreshortened medially, longer than wide, narrowing posteriorly, where it is a little convex, anterior margin arcuately concave, posterior margin incised; propodeum very finely rugulose; abdomen elongate elliptical, smooth and polished; wings subinfuscate, with a very faint yellowish brown pigmentation; length 2.75 mms.

Described from five females (type and paratypes). Type from Tantalus Mountain, Oahu, collected by D. T. Fullaway, January 3, 1910. One specimen from Kunia, Oahu, one from Manoa Ridge, Oahu, collected by D. T. Fullaway, March 24, 1910, and February 13, 1917, respectively; one specimen from Kaumuohona, Oahu, collected by P. H. Timberlake, September 9, 1917, and one specimen from S. E. Koolau Mountains, Oahu, collected by J. C. Bridwell on the same day, paratypes.

Type: Cat. No. 150, Bishop Museum.

151. *Sierola tenuiceps* n.sp.

♀ slender; shining black, legs and antennæ luteous, mandibles reddish brown.

Head and thorax to the propodeum with a microscopically fine and close reticulate surface sculpture, a little coarser on the head; impunctate or nearly so, the punctuation extremely fine and hardly discernible; hairy clothing short and inconspicuous. Head nearly twice as long as wide, length from eye to vertex equalling the width between the eyes; flatly convex above, depressed in front, a little tumid beneath; vertical margin slightly convex, temples rounded, eyes convex; antennæ a little longer than the head, pedicel and first funicle segment longer than wide, the following segments as wide as long, antennal fossæ deep; clypeus short, carinate, apically depressed, almost perpendicular, hardly projecting in front of the anterior margin of the head, which is angulate, not transverse, sloping at the sides; mandibles slender, curved, concavo-convex, truncate apically and toothed, base not reaching the eye; gula and sides of the head flat, the former medially foreshortened, longer than wide, narrowing behind, where there is a shallow sulcus in the median line, anterior margin arcuately concave, posterior margin incised; propodeum rugulose; abdomen elongate ovate, apically acuminate, smooth and polished; wings subinfuscate, with a very faint yellowish brown pigmentation; length 2 mms.

Described from two females (type and paratype). Type from Honolulu, Oahu, collected by J. C. Bridwell, April, 1916. Second specimen collected at Kunia, Oahu, by D. T. Fullaway, March 9, 1910, paratype.

Type: Cat. No. 151, Bishop Museum.

152. *Sierola nitens* n.sp.

♀ a little slender; shining black, the legs, mandibles and antennæ basally yellowish brown, antennæ fuscous outwardly.

Head and thorax with a microscopically fine and delicate reticulate surface sculpture; impunctate and glabrous, or nearly so, the very fine pin punctures and short hairy clothing inconspicuous. Head longer than wide by a third, width between the eyes greater than the length from eye to vertex; flat above, tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, pedicel and first funicle segments nearly twice as long as wide, antennal fossæ deep; clypeus short, flat, vertical, indistinctly carinate, not projecting in front of the anterior margin of the head, which is angulate, not transverse; mandibles slender, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula and sides of the head flat, the former medially foreshortened, as wide as long, narrowing somewhat posteriorly, where there is a small but deep sulcus in the median line, anterior margin almost straight, posterior margin incised; abdomen somewhat depressed, elongate ovate, smooth and polished; wings subinfuscate, with a yellowish brown pigmentation; length 2.25 mms.

Described from two females (type and paratype). Type from Kaala Mountain, Oahu, 2500 ft. elevation, collected by P. H. Timberlake on *Pelea clusiaefolia*, March 4, 1917. Second specimen, collected on Kaala Mountain, Oahu, by O. H. Swezey, September 1, 1913, paratype.

Type: Cat. No. 152, Bishop Museum.

153. *Sierola kaumuohona* n.sp.

♀ shining black, legs and antennæ basally yellowish brown, hind femora and antennæ apically fuscous, abdomen yellowish brown to piceous.

Head and thorax to the propodeum with a microscopically fine and delicate reticulate surface sculpture; coarsely, shallowly and remotely punctate; clothed with sparse, short, fairly stiff silver white hairs. Head longer than wide, width between the eyes more than the length from eye to vertex; flat above, depressed in front, tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin straight, temples rounded, eyes flat; antennæ nearly reaching the mesoscutum, all the segments longer than wide, pedicel twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed, not projecting in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles rather slender, curved, truncate apically and toothed, base touching the eye above; gula flatly convex, medially foreshortened, a little wider than long, narrowing behind, where there is a slight depression in the groove, anterior margin arcuately concave, posterior margin incised; propodeum very finely rugulose; abdomen elongate ovate, smooth and polished; wings with a deep yellowish brown to fuscous pigmentation; length 2 mms.

Described from one female (type) collected on Kaumuohona, Oahu, by P. H. Timberlake, September 9, 1917.

Type: Cat. No. 153, Bishop Museum.

154. *Sierola brunneiventris* n.sp.

♀ shining black, legs, antennæ basally and apical margin of abdominal segments, particularly at the sides, brown, antennæ outwardly fuscous.

Head and thorax to the propodeum with a microscopically fine and shallow reticulate surface sculpture; coarsely, shallowly and fairly closely punctate, but not uniformly so; clothed, rather thickly on the gula, with delicate silver gray hairs. Head wider than the thorax, longer than wide by a half, length from eye to vertex equalling the width between the eyes; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ about as long as the head, pedicel a little longer than wide, the following segments wider than long, antennal fossæ deep; clypeus carinate, apically depressed, hardly projecting in front of the anterior margin of the head, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles stout, curved, concavo-convex, truncate apically and toothed, base not reaching the eye; gula flatly convex, finely and closely punctate, medially foreshortened, as wide as long narrowing posteriorly, anterior margin arcuately concave, posterior margin incised; propodeum very finely rugulose; abdomen ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 3 mms.

Described from two females (type and paratype) collected on Tantalus Mountain, Oahu, elevation 1300 ft., by W. M. Giffard, October 15, 1905, and numbered 10.

Type: Cat. No. 154, Bishop Museum.

155. *Sierola blackburni* n.sp.

♀ shining black, the legs and antennæ brown to fuscous.

Head and thorax with a microscopically fine reticulate surface sculpture; coarsely and fairly closely punctate; clothed with short silver gray hairs. Head longer than wide by a half, width between the eyes a little more than the length from eye to vertex; flatly convex above, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ a little longer than the head, pedicel longer than wide, the following segments as wide as long, antennal fossæ deep; clypeus carinate, apically depressed, hardly projecting in front of the anterior margin of the head, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles short, stout, curved, truncate apically and toothed, base not quite reaching the eye; gula and sides of the head flat, the former medially foreshortened, as wide as long, narrowing behind, anterior margin arcuately concave, posterior margin incised; abdomen short ovate, apically acuminate, smooth and polished; wings subinfuscate, with a very faint fuscous pigmentation; length 2.5 mms.

Described from one female (type) collected on Kau, Hawaii, a-a flows, 3600 ft. elevation, by W. M. Giffard, July 18, 1918.

Type: Cat. No. 155, Bishop Museum.

156. *Sierola celeris* n.sp.

♀ shining black, the legs and antennæ basally yellowish brown, hind femora and antennæ outwardly fuscous.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; coarsely, shallowly, fairly closely punctate, and hairy. Head wider than the thorax, longer than wide by a half, length from eye to vertex equalling the width between the eyes; convex above, a little tumid beneath, the greatest depth behind the eye; vertical margin straight, temples rounded, eyes flat; antennæ a little longer than the head, pedicel and first funicle segment twice as long as wide, second a little shorter, the following segments as wide as long, antennal fossæ deep; clypeus carinate, apically depressed but rather flat, not projecting in front of the anterior margin of the head, sloping at the sides; mandibles stout, curved, a little flattened outwardly, truncate apically and toothed, base touching the eye above; gula and sides of the head flat, the former medially foreshortened, as wide as long, narrowing behind, anterior margin arcuately concave, posterior margin incised; propodeum rugulose, with a narrow triangular area medially at the base smooth; abdomen ovate, apically acuminate, smooth and polished; wings hyaline; length 2.25 mms.

Described from one female (type) collected on Tantalus Mountain, Oahu, by O. H. Swezey, March 16, 1915.

Type: Cat. No. 156, Bishop Museum.

157. *Sierola perkinsi* n.sp.

♀ shining black, legs and antennæ basally yellowish brown, front and hind femora and antennæ outwardly fuscous, mandibles outwardly reddish brown.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; fairly coarsely and closely punctate; clothed with delicate silver gray hairs. Head a little longer than wide, widest across the eyes, narrowing behind and in front, width between the eyes greater by a half than the length from eye to vertex; flatly convex above, depressed in front, tumid beneath, the greatest depth directly behind the eye; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, pedicel twice as long as wide, antennal fossæ deep; clypeus reduced by erosion from the sides to a thin carinate ridge, apically depressed, hardly projecting in front of the anterior margin of the head, which is angulate, not transverse, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula and sides of the head flat, the former a little foreshortened medially, longer than wide, narrowing behind, anterior margin arcuately concave, posterior margin incised; abdomen ovate, apically acuminate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.25 mms.

Described from one female (type) collected at Kilauea, Hawaii, dry forest, 4000 ft. elevation, by W. M. Giffard and F. Muir, November 1, 1917.

Type: Cat. No. 157, Bishop Museum.

158. *Sierola perottetiae* n.sp.

♀ shining black, the legs and antennæ fuscous except the scape, pedicel, trochanters, tibiæ and tarsi, which are yellowish brown.

Head and thorax to the propodeum with a microscopically fine and delicate reticulate surface sculpture; coarsely, shallowly and remotely punctate; hairy clothing short and inconspicuous. Head longer than wide by a third, width between the eyes greater than the length from eye to vertex, length in front of the eyes not great; flatly convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ not much longer than the head, pedicel and first funicle segment longer than wide, the following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed, hardly projecting in front of the anterior margin of the head, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles stout, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula and sides of the head flatly convex, the former a little foreshortened, as wide as long, flat and depressed in front as well as in the groove behind, anterior margin arcuately concave, posterior margin incised; propodeum finely rugulose; abdomen ovate, smooth and polished; wings subinfuscate, with a faint fuscous pigmentation; length 2.5 mms.

Described from three females (type and paratypes) from Manoa Cliff Trail Tantalus, Oahu, reared from decaying wood of *Perottetia sandwicensis* by J. C. Bridwell, July, 1918.

Type: Cat. No. 158, Bishop Museum.

159. *Sierola humilis* n.sp.

♀ shining black, antennæ, trochanters, fore-tibiæ and tarsi, middle and hind tarsi yellowish brown.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; coarsely and fairly closely punctate; hairy clothing short and inconspicuous. Head a little longer than wide, width between the eyes greater than the length from eye to vertex; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ hardly longer than the head, pedicel and first funicle segment a little longer than wide, the following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed, hardly projecting in front of the anterior margin of the head, which is angulate, not transverse, sloping at the sides, the carina extending backward shortly on the top of the head; mandibles fairly stout, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula and sides of the head flatly convex, the former medially foreshortened, wider than long and finely punctate, anterior margin arcuately concave, posterior margin incised; propodeum finely rugulose; abdomen elongate ovate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.5 mms.

Described from one female (type) collected on ridge south of Iao Valley, W. Maui, 1800-2000 ft. elevation, by J. C. Bridwell, September 1, 1918.

Type: Cat. No. 159, Bishop Museum.

160. *Sierola proxima* n.sp.

♀ shining black, the legs and antennæ brown.

Head and thorax with a microscopically fine and delicate reticulate surface sculpture; finely, shallowly and fairly closely punctate, hairy clothing short and inconspicuous. Head a little longer than wide, width between the eyes a little more than the length from eye to vertex; convex above and beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ a little longer than the head, pedicel a little longer than wide, the following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed, hardly projecting in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles stout, curved, concavo-convex, truncate apically and toothed, base not quite reaching the eye; gula and sides of the head flatly convex, the former medially foreshortened, wider than long and finely punctate, anterior margin arcuately concave, posterior margin incised; abdomen ovate, smooth and polished; wings subinfuscate, with a very faint yellowish brown pigmentation; length 2.5 mms.

Described from one female (type) collected on Tantalus Mountain, Oahu, 1300 ft. elevation, by W. M. Giffard.

Type: Cat. No. 160, Bishop Museum.

161. *Sierola langfordi* n.sp.

♀ dull shining black, legs and antennæ yellowish brown to fuscous.

Head and thorax with a microscopically fine and delicate reticulate surface sculpture; finely and somewhat remotely punctate, and hairy. Head considerably longer than wide, widest across the eyes, narrowing behind and in front, width between the eyes greater than the length from eye to vertex; flatly convex above, depressed in front, tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, pedicel nearly twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed, the point blunt, hardly projecting in front of the anterior margin of the head, which is angulate, not transverse, sloping at the sides; mandibles stout, bent at the middle, outer half flattened, truncate apically and toothed, base not quite reaching the eye; gula and sides of the head flat, the former medially foreshortened, wider than long, narrowing behind, with a depression along the median line, anterior and posterior margins arcuately concave; abdomen ovate, apically acuminate, smooth and polished; wings subinfuscate, with a very faint fuscous pigmentation; length 3 mms.

Described from one female (type) collected on Tantalus Mountain, Oahu, elevation 1300 ft., by W. M. Giffard, November 1-2, 1905.

Type: Cat. No. 161, Bishop Museum.

162. *Sierola aspera* n.sp.

♀ dull shining black, legs and antennæ yellowish brown except the hind femora, the coxæ and the apical segments of the flagellum, which are fuscous.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture, coarser on the head and prothorax than on the mesothorax and scutellum; coarsely, shallowly and closely punctate; hairy clothing fairly long and thick. Head longer than wide by a half, width between the eyes hardly exceeding the length from eye to vertex; flatly convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ a little longer than the head, pedicel and first funicle segment twice as long as wide, the following segments hardly longer than wide, antennal fossæ deep; clypeus carinate, apically depressed, almost perpendicular, not projecting in front of the anterior margin of the head, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles stout, curved, truncate apically and toothed, base touching the eye above, lower lobe protuberant; gula and sides of the head flatly convex, the former medially foreshortened, as wide as long, anterior margin arcuately concave, posterior margin incised; propodeum rugulose; abdomen somewhat piceous, ovate, smooth and polished; wings subinfuscate, with a very faint fuscous pigmentation; length 2.25 mms.

Described from one female (type) collected on Kaumuohona, Oahu, by O. H. Swezey, December 5, 1907.

Type: Cat. No. 162, Bishop Museum.

163. *Sierola atra* n.sp.

♀ dull shining black, antennæ, tibiæ and tarsi brown black.

Head and thorax with a microscopically fine reticulate surface sculpture; finely, shallowly and closely punctate but not uniformly so; hairy clothing short and inconspicuous. Head wider than the thorax, a little longer than wide, width between the eyes considerably more than the length from eye to vertex, length in front of the eyes not great; convex above, a little tumid beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ hardly longer than the head, pedicel and first funicle segment longer than wide, the following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed, hardly projecting in front of the anterior margin of the head, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles short and stout, bent at the middle, truncate apically and toothed, base touching the eye above; gula and sides of the head flatly convex, the former medially foreshortened, a little wider than long, median groove effaced, anterior margin arcuately concave, posterior margin incised; propodeum very finely rugulose; abdomen short ovate, apically acuminate, smooth and polished; wings subinfuscate, with a very faint fuscous pigmentation; length 2 mms.

Described from one female (type) collected at 29 miles, Olaa, Hawaii, 3800 ft. elevation, by W. M. Giffard, August 10, 1918.

Type: Cat. No. 163, Bishop Museum.

164. *Sierola newelli* n.sp.

♀ dull shining black, antennæ and legs yellowish brown to fuscous.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; finely and fairly closely punctate; hairy clothing rather sparse, the hairs long and delicate. Head as wide as long, width between the eyes nearly twice the length from eye to vertex, length in front of the eyes not great; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, antennal fossæ deep; clypeus carinate, apically depressed, hardly projecting in front of the anterior margin of the head, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles fairly slender, curved, truncate apically and toothed, base not quite reaching the eye; gula and sides of the head flat, the former a little foreshortened medially, as wide as long, narrowing posteriorly, anterior and posterior margins arcuately concave; propodeum rugulose; abdomen ovate, apically acuminate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.25 mms.

Described from one female (type) collected on Kau, Hawaii, a-a flows, 3600 ft. elevation, by W. M. Giffard, July 18, 1918.

Type: Cat. No. 164, Bishop Museum.

165. *Sierola waianaeana* n.sp.

♀ dull shining black, legs and antennæ brown to fuscous, mandibles reddish apically.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; finely, shallowly and fairly closely punctate but not uniformly so; hairy clothing short and inconspicuous. Head considerably longer than wide, widest across the eyes, narrowing behind and in front, width between the eyes greater than the length from eye to vertex; flatly convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and bluntly pointed, not projecting in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides; mandibles fairly slender, bent at the middle, the distal portion flattened, truncate apically and toothed, base touching the eye above; gula and sides of the head flatly convex, the former medially foreshortened, as wide as long, a little depressed along the median line, anterior and posterior margins arcuately concave; propodeum finely rugulose; abdomen ovate, smooth and polished; wings subinfuscate, with a very faint yellowish brown pigmentation; length 2.25 mms.

Described from one female (type) collected in the Waianae Mountains, Oahu, by D. T. Fullaway, March 5, 1911.

Type: Cat. No. 165, Bishop Museum.

166. *Sierola distinguenda* n.sp.

♀ dull shining black, legs and antennæ basally yellowish brown, the antennæ fuscous outwardly, mandibles marked with red.

Head and thorax with a microscopically fine reticulate surface sculpture; fairly coarsely, shallowly and closely punctate; hairy clothing short and delicate. Head a little longer than wide, widest across the eyes, narrowing behind and in front, width between the eyes greater than the length from eye to vertex by a half; convex above, depressed in front, a little tumid beneath; vertical margin slightly convex, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments longer than wide, pedicel and first funicle segment twice as long as wide, antennal fossæ deep; clypeus carinate, apically depressed, hardly projecting in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles slender, curved, a little flattened outwardly, truncate apically and toothed, base not reaching the eye; gula and sides of the head flatly convex, the former medially foreshortened, as wide as long, anterior margin arcuately concave, posterior margin incised; abdomen short ovate, apically acuminate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation: length 2.25 mms.

Described from one female (type) collected on Kaala Mountain, Oahu, by D. T. Fullaway, August 11, 1912.

Type: No. 166, Bishop Museum.

167. *Sierola rufomandibulata* n.sp.

♀ dull shining black, legs and antennæ yellowish brown, the latter fuscous outwardly, mandibles marked with red.

Head and thorax to the propodeum with a microscopically fine and close reticulate surface sculpture; finely and rather closely punctate, and hairy. Head a little longer than wide, width between the eyes a little more than the length from eye to vertex; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes convex; antennæ nearly reaching the mesoscutum, all the segments longer than wide, antennal fossæ deep; clypeus carinate, apically depressed, not projecting in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles slender, curved, truncate apically and toothed, base not quite reaching the eye; gula and sides of the head flatly convex, the former medially foreshortened, longer than wide, narrowing behind, very finely punctate, median groove nearly effaced, anterior margin straight, posterior margin incised; propodeum rugulose; abdomen ovate, smooth and polished; wings with a yellowish brown pigmentation; length 2.25 mms.

Described from one female (type) collected in Manoa Valley, Oahu, by O. H. Swezey, July 27, 1913.

Type: Cat. No. 167, Bishop Museum.

168. *Sierola curiosa* n.sp.

♀ dull shining black, legs and antennæ apically fuscous, the latter basally yellowish brown.

Head and thorax with a microscopically fine reticulate surface sculpture; fairly coarsely, shallowly and closely punctate; hairy clothing short and inconspicuous. Head a little longer than wide, width between the eyes a little more than the length from eye to vertex; convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ a little longer than the head, all the segments longer than wide, antennal fossæ deep; clypeus carinate, apically depressed and bluntly pointed, not projecting in front of the anterior margin of the head, which is angulate, not transverse, the carina extending backward shortly on the top of the head; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula and sides of the head flatly convex, the former medially foreshortened, as wide as long, with a shallow depression along the median line, anterior margin arcuately concave, posterior margin incised; abdomen elongate ovate, smooth and polished; wings with a shallow yellowish brown pigmentation; length 2 mms.

Described from one female (type) collected at Kuliouou, Oahu, by P. H. Timberlake, June 25, 1916.

Type: Cat. No. 168, Bishop Museum.

169. *Sierola subcrispa* n.sp.

♀ dull shining black, almost opaque; legs and antennæ basally luteous, the femora and antennæ apically fuscous.

Head and thorax to the propodeum with a microscopically fine and close reticulate surface sculpture; finely and closely punctate; clothed with long silver gray hairs. Head longer than wide by a half, widest across the eyes, narrowing behind and in front, width between the eyes considerably more than the length from eye to vertex; flatly convex above, depressed in front, a little tumid beneath; vertical margin straight, temples rounded, eyes flatly convex; antennæ a little longer than the head, pedicel and first three funicular segments a little longer than wide, the following segments hardly longer than wide, antennal fossæ deep; clypeus carinate, apically depressed, hardly projecting in front of the anterior margin of the head, which is angulate, not transverse, sloping at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles fairly stout, curved, truncate apically and toothed, base not quite reaching the eye; gula and sides of the head flatly convex, the former medially foreshortened, wider than long, depressed slightly along the median line and in front, anterior margin nearly straight, posterior margin incised; propodeum finely rugulose; abdomen elliptical, apically acuminate, smooth and polished; wings subinfuscate, with a faint yellowish brown pigmentation; length 2.5 mms.

Described from one female (type) collected on Manoa Ridge, Oahu, by D. T. Fullaway, February 13, 1917.

Type: Cat. No. 169, Bishop Museum.

170. *Sierola nuda* n.sp.

♀ dull black, head almost opaque; legs yellowish brown, the femora infuscate, antennæ yellowish brown basally, fuscous apically, mandibles reddish brown except at the base.

Head and thorax with a microscopically fine reticulate surface sculpture, coarser on the head; coarsely, shallowly and remotely punctate; hairy clothing short, sparse and inconspicuous. Head a little longer than wide, width between the eyes greater than the length from eye to vertex, length in front of the eyes not great; convex above, depressed in front, tumid beneath, the greatest depth directly behind the eye; vertical margin straight, temples rounded, eyes flatly convex; antennæ nearly reaching the mesoscutum, pedicel and first three funicular segments longer than wide, the following segments as wide as long, antennal fossæ deep; clypeus carinate, apically depressed, hardly projecting in front of the anterior margin of the head, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula and sides of the head convex, the former medially foreshortened, as wide as long, slightly depressed along the median line, anterior and posterior margins arcuately concave; abdomen a little depressed, ovate, smooth and polished; wings with a fuscous pigmentation; length 2.5 mms.

Described from one female (type) collected at Kuliouou, Oahu, by D. T. Fullaway, July 12, 1918.

Type: Cat. No. 170, Bishop Museum.

171. *Sierola willardi* n.sp.

♀ dull black, the head almost opaque; legs and antennæ brown, the latter fuscous outwardly.

Head and thorax to the propodeum with a microscopically fine and close reticulate surface sculpture; finely and closely punctate; hairy clothing short and inconspicuous. Head as wide as long, widest across the eyes, narrowing behind and in front, width between the eyes nearly twice the length from eye to vertex; convex above, depressed in front, tumid beneath, the greatest depth beneath the eye; vertical margin straight, temples rounded, eyes convex; antennæ reaching the mesoscutum, all the segments considerably longer than wide, antennal fossæ deep; clypeus carinate, apically depressed, hardly projecting in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward shortly on the top of the head; mandibles fairly stout, curved, truncate apically and toothed, base touching the eye above; gula and sides of the head convex, the former medially foreshortened, as wide as long, median groove nearly effaced, anterior margin arcuately concave, posterior margin incised; propodeum rugulose; abdomen ovate, smooth and polished; wings with a yellowish brown pigmentation; length 3 mms.

Described from one female (type) collected on Kaala Mountain, Oahu, by J. C. Bridwell, July 4, 1916.

Type: Cat. No. 171, Bishop Museum.

DESCRIPTIONS OF NEW EXOTIC SPECIES.

1. *Sierola vitiensis* n.sp.

♀ shining black, legs, antennæ and mandibles yellowish brown to fuscous.

Head and thorax to the propodeum with a microscopically fine reticulate surface sculpture; fairly coarsely and closely punctate; hairy clothing short. Head longer than wide, widest across the eyes, narrowing behind and in front, width between the eyes more than the length from eye to vertex; flatly convex above, depressed in front, a little tumid beneath, the greatest depth beneath the posterior end of the eye; vertical margin straight, temples rounded, eyes flatly convex; antennæ slender, longer than the head, pedicel twice as long as wide, the following segments only a little longer than wide, antennal fossæ deep; clypeus carinate, apically depressed, hardly projecting in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles slender, curved, truncate apically and toothed, base touching the eye above; gula and sides of the head flat, the former medially foreshortened, as wide as long, narrowing behind, anterior margin nearly straight, posterior margin incised; propodeum rugulose; abdomen ovate, apically acuminate, smooth and polished; wings subinfuscate; length 2 mms.

♂ smaller; antennal segments beyond the pedicel shorter, hardly longer than wide, abdomen bluntly pointed at the apex.

Described from one female and one male (type and allotype) collected at Rewa, Fiji, by F. Muir, March, 1906.

A male specimen from Ba, Fiji, collected in January, 1906, appears somewhat different.

Type: Cat. No. 172, Bishop Museum.

2. *Sierola sinensis* n.sp.

♀ dull shining black to the abdomen, which is smooth and polished, the head opaque or nearly so; antennæ yellowish brown, fuscous apically, legs fuscous basally, tibiæ and tarsi yellowish brown.

Head and thorax to the propodeum with a microscopically fine and close reticulate surface sculpture, coarser on the head; finely and closely punctate; hairy clothing short and inconspicuous. Head longer than wide by a half, width between the eyes more than the length from eye to vertex; flat above, depressed in front, convex beneath; vertical margin straight, temples rounded, eyes flat; antennæ hardly longer than the head, the pedicel a little longer than wide, the following segments as wide as or wider than long, antennal fossæ deep; clypeus carinate, apically depressed and projecting slightly in front of the anterior margin of the head, which is angulate, not transverse, declivous at the sides, the carina extending backward on the top of the head beyond the base of the antennæ; mandibles fairly stout, curved, concavo-convex, truncate apically and toothed, base touching the eye above; gula and sides of the head flatly convex, the former medially foreshortened, as wide as long, anterior margin arcuately concave, posterior margin incised; propodeum rugulose; abdomen ovate, apically acuminate; wings subinfuscate; length 2 mms.

Described from one female (type) collected at Chin San, Macao, China, by F. Muir, December, 1906.

Type: Cat. No. 173, Bishop Museum.

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OCCASIONAL PAPERS

OF THE

BERNICE PAUAHI BISHOP MUSEUM OF POLYNESIAN ETHNOLOGY AND NATURAL HISTORY

Vol. VII, No. 8.

Director's Report for 1919

HONOLULU, HAWAII
Bishop Museum Press
1920

Bernice Pauahi Bishop Museum

1919

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Director's Report for 1919

ORGANIZATION OF THE STAFF

At the end of the year 1919, the staff of the Museum was as follows:

Herbert E. Gregory, Acting Director.
William T. Brigham, Director Emeritus.
William H. Dall, Honorary Curator of Mollusca.
Otto H. Swezey, Honorary Curator of Entomology.
John F. G. Stokes, Curator of Polynesian Ethnology.
C. Montague Cooke, Curator of Pulmonata.
Charles N. Forbes, Curator of Botany.
John W. Thompson, Artist and Modeler.
Elizabeth B. Higgins, Librarian.
Edwin H. Bryan, Assistant in Entomology.
George C. Munro, Assistant in Ornithology.
Helen M. Helvie, Superintendent of Exhibition Halls.
Lahilahi Webb, Guide to Exhibits.

Early in the year arrangements were made with Yale University for the temporary release of Herbert E. Gregory, Silliman Professor of Geology, to assist the Trustees in formulating plans for the further development of the Museum. With the title of Acting Director, Professor Gregory assumed administrative charge in May. Before his arrival the duties of the Director's office were performed by the Curator of Polynesian Ethnology, John F. G. Stokes. From September to the end of the year, the Acting Director was represented by the Curator of Pulmonata, C. Montague Cooke.

On July 1, Edwin H. Bryan, of the College of Hawaii, was appointed Assistant in Entomology.

On August 11, Mrs. Lahilahi Webb, who holds a prominent position among the Hawaiians, was appointed as guide to the collections in the Exhibition Halls.

Leave of absence for one year beginning September 1 has been granted to Elizabeth B. Higgins to study library management and editorial work at institutions on the mainland. It is expected that on her return Miss Higgins will assume the duties of Librarian and Editor.

J. J. Greene, whose services of Museum printer for twenty-one years have been of exceptional merit, severed his connection with the staff on October 1, 1919.

M. L. Horace Reynolds, cabinet maker, severed his connections with the Museum on November 1. His work has been entirely satisfactory.

On December 19, George C. Munro, who for some years has given the Museum the benefit of his extensive knowledge of Hawaiian birds, was appointed Assistant in Ornithology. His connection with the staff should result in increasing and enriching the collection of native birds.

With the completion of the manuscript of the Fornander papers in December, the obligations to the Museum of Thomas G. Thrum have been fulfilled. The task of editing has demanded not only painstaking effort but also a knowledge of ancient Hawaiian possessed by few men.

WORK OF THE STAFF

In addition to routine administrative duties the time of the Acting Director has been given largely to consultation with the Trustees and with members of the staff with a view to recommending changes in the present organization, defining the scope and purpose of the Museum's activities, and formulating a policy for future development. As a guide to the study of these topics, a memorandum submitted to the Trustees by Professor Gregory in January 1918 was found helpful. Visits to other museums, and correspondence and interviews with scientists interested in Pacific Ocean problems have been found profitable.

Since resigning the Directorship December 31, 1917, William T. Brigham, Director Emeritus, has had the long-desired opportunity to continue his studies without interruption. Considerable progress has been made during the year in the preparation of a memoir on Hawaiian worship.

The Curator of Polynesian Ethnology, John F. G. Stokes, was busy with administrative affairs during the first four months of the present year, but found time to study the field relations of an interesting skeleton discovered at Kilauea. During the period April to July a systematic study of the ruined asylum ("City of Refuge") at Honaunau was made with a view to procuring the necessary data for writing the history of this ancient asylum and for determining the form of the original structure. The preparation for publication of a report on Honaunau was postponed in order to prepare plans and descriptions of various Hawaiian temple sites for incorporation in Dr. Brigham's forthcoming work on Hawaiian worship.

The time of the Curator of Pulmonata, C. Montague Cooke, Jr., has been chiefly given to cataloguing the unusually large collections recently received. (See page 120.)

During the year a conchological survey was made of parts of the island of Molokai and three weeks were spent on a profitable collecting trip above the valley of Waimea on the island of Kauai.

To aid in cataloguing collections, Mr. A. Gouveia was employed by the Curator for the last three months of the year. To continue this work it is proposed to add to the staff a trained assistant in Malacology.

The Curator of Botany, Charles N. Forbes, spent the first half of the year on routine herbarium work and the preparation of three papers on New Hawaiian plants. Twelve short field trips were made to places on the island of Oahu. In July a botanical survey of the island of Maui was begun, and carried on with few interruptions to the end of the year.

The Honorary Curator of Entomology, Otto H. Swezey, has given generously of his time in collecting and labeling insect material and formulating plans for the guidance of the Acting Director. He has been ably assisted by Edwin H. Bryan.

The museum's Artist and Modeler, John W. Thompson, prepared during the year 64 casts for the exhibition halls; 34 fish, 17 fruit, 13 archaeological and 7 miscellaneous. Fish for modeling were obtained and presented to the Museum by John W. Thompson and C. M. Cooke III., and thirteen varieties of Hawaiian taro were presented by Gerrit P. Wilder. Among the specimens presented by Mr. Thompson and of which painted models have been made, are two deep water sharks, 12 inches and 15 inches long respectively, of unknown species.

In a paper on Habits and Coloration of Hawaiian Brachyura and Fishes, published by the Carnegie Institution, Dr. W. H. Longley, in acknowledging his indebtedness to the Bishop Museum, states that "what is probably the best existing record of the form and coloration of a group of tropical fishes of comparable numbers is embodied in the series of painted casts of more than 340 species prepared by Mr. John W. Thompson for the Bishop Museum, Honolulu."

Helen M. Helvie continues in charge of the exhibition halls. Since September first she has been assisted in caring for visitors by Lahilahi Webb.

The Librarian, Elizabeth B. Higgins, has devoted her time chiefly to cataloguing and to a general consideration of the library's place in the plans for enlargement of the Museum's activities. During the absence of Miss Higgins, September to January, the routine work of the library was efficiently performed by Miss Carolyn Dickerman.

Although not officially a member of the Staff, Gerrit P. Wilder has given generously of his time and thought in building up for the Museum a unique collection of Hawaiian food plants. Among other things he has collected, grown, and cross-bred many varieties of native taro, and has obtained from Hawaiians the names, peculiarities, and uses of the different forms of this interesting plant. It is hoped that the studies of Mr. Wilder will result in publications of value to botanists and to ethnologists.

PUBLICATIONS

During the year the following publications were issued:

Memoirs Volume V, Number 2. Fornander Collection of Hawaiian Antiquities and Folk-lore, edited by Thomas G. Thrum, 1919, 277 pages.

Memoirs Volume V, Number 3. Fornander Collection of Hawaiian Antiquities and Folk-lore, edited by Thomas G. Thrum, 1919, 216 pages.

Memoirs Volume V, Index. 17 pages.

Volume V, which constitutes the Second Series of the Fornander papers, contains legends, stories and biographical sketches of ancient Hawaii. The text is in the original Hawaiian with English translation and explanatory notes.

Memoirs Volume VI, Number 1. Fornander Collection of Hawaiian Antiquities and Folk-lore, edited by Thomas G. Thrum. 1919, 217 pages.

Memoirs Volume VI, Number 2. Fornander Collection of Hawaiian Antiquities and Folk-lore, edited by Thomas G. Thrum. 1919, 137 pages.

Like the preceding series of Fornander papers, the text of Volume VI is in Hawaiian and in English. Number 1 deals chiefly with religious ceremonies; number 2 is a collection of miscellaneous studies in history, philology and geneology. The remaining manuscript of the Fornander papers, consisting of native Hawaiian songs and chants, has been submitted by the editor. It will be issued as Memoirs Volume VI, Number 3.

Memoirs Volume VII, Number 2. A monographic study of the Hawaiian species of the Tribe Lobelioideae, Family Campanulaceae, by Joseph F. Rock, 1919, 305 pages, 217 plates.

This volume is the result of a study of Lobelioideae in Hawaii and in the museums of Europe and America. Of the seven genera discussed, six of them: Trematolobelia, Brighamia, Cyanea, Clermantia, Delissea and Rollandia are peculiar to Hawaii; the seventh Lobelia, has world-wide distribution. These genera include 104 species which occur only in the Hawaiian Islands. The publication of this volume is timely, for some of the old and most interesting species of Lobelioideae have become extinct and others are disappearing.

Occasional Papers Volume III and Volume VI have been completed by the addition of indexes and tables of contents. A revised list of the Museum publications also has been issued.

From 1898 to October of the present year, the Museum has maintained a printing establishment. Volumes I to IV of the Memoirs, Volumes I to VI of the Occasional Papers, and numbers 1, 3, 4, and 5 of the Miscellaneous Publications, were printed from type set by hand in the Museum building. For the publication of Memoirs Volume V (1918), arrangements were made with a printing house in the city for linotype composition an for press work, and the Museum printer was enabled to devote his time to miscellaneous work.

A comparative study of costs, quality and conditions of work in various establishments resulted in a decision to dispose of the printing equipment owned by the Museum and to contract with some reliable concern for all printing required.

SPECIAL TOPICS

LIBRARY

During the year, the present condition, the scope, purpose, and needs of the Museum Library have been given consideration by the Trustees, the Librarian, and the Acting Director. It was found that the Library is unusually rich in ethnological works of Pacific races and in accounts of early voyagers. Most of the books are essential to students within the Polynesian field and some of them could be replaced with difficulty. Compared with similar institutions, the Library of the Museum is relatively deficient in maps and other geographic material, in general reference works and compendia and in results of researches in Natural History published during the last decade. The report of the Committee on Publication is summarized as follows:

"Your Committee believes that the library should be built on the lines already marked out and should eventually occupy first rank as a center for students interested in Polynesian problems; that it should be enriched by large additions of scattered pamphlets of recent date bearing on Polynesian Ethnology and Natural History and that outside this field purchases should aim primarily at procuring reliable works for comparative study and treatises needed by students. The library should be primarily for use of scientific investigators, and works of merely popular interest should find no place on the shelf. The guiding principle should be not to make a complete or well-rounded library but to get together publications likely to aid students of Pacific Ocean and especially of Polynesian problems. With this principle in mind it is probably unnecessary to list the subdivisions of natural history which should be represented."

The funds allotted to carry out the policy adopted by the

Trustees and changes in organization and management will greatly increase the value of the library to scientific investigators. Cooperative arrangements are being perfected by the Museum, the College of Hawaii, the Sugar Planters' Experiment Station, the Historical Society and the Public Library, for the interchange of books and the elimination of expense incident to unnecessary duplication. By combining the rapidly increasing resources of the various Hawaiian libraries and thereby enabling each institution to devote attention to its particular field of interest, the opportunity is afforded to make the facilities for students working in Honolulu equivalent to those afforded by large educational centers on the mainland.

Field Work

The collections in Ethnology and Natural History belonging to the Museum, have been acquired chiefly through gift and purchase; much of the valuable material contributed by members of the staff has been gathered incidentally and not infrequently in vacation periods and at the expense of the collector. It seems desirable that systematic field surveys in archaeology, botany, and other branches of the Museum's activities should be made first of the Hawaiian Islands, second of other Polynesian island groups and later of the regions bordering Polynesia. During the present year Mr. Stokes and Mr. Forbes have spent several months in the field and the plans for 1920 involve considerable extension of investigations in areas from which information is desired.

The Entomological Society

The Hawaiian Entomological Society has given generously of its time and thought to the work of the Museum. At the request of the Acting Director, the Society has prepared comprehensive statements on the "Biological Problems of the Hawaiian Insect Fauna" and on "Entomological Exploration of the Pacific".

Through its Committee on Entomological Organization, the Society has submitted the following suggestions which in the opinion of the Acting Director should define the attitude of the Museum.

It is only natural that a subject of such consuming interest to the active workers in entomology here, as the entomological policy of the Bishop Museum, should receive further thought and deliberation, and we find ourselves at present, after the lapse of six months, burdened with many suggestions of a specific nature on the means of accomplishing the work outlined. Regarding a "Reference Collection of Hawaiian Insects," we desire to state our absolute conviction that nothing of importance can be accomplished in the way of building up such a collection of Hawaiian insects until a competent, trustworthy and permanent curator of insects is appointed. Only a competent man can do the work well, and the labor involved would require his enire time for many years. It has been stated before that there are types and series of specimens of endemic as well as introduced insects ready for the Museum when a competent and trustworth custodian is provided and liberal regulation of their use admitted.

It has also been pointed out that the Museum now has representatives of sixty-four per cent of the species of Hawaiian insects known and listed at the time the Fauna Hawaiiensis was published. These are virtually types, being actual specimens in hand when the descriptions were made. With so large a proportion already possessed a complete representation seems eminently desirable, and its importance to workers here, who are desirous of carrying on the labors of Blackburn, Perkins, Kirkaldy and others, cannot be over-stated. It is impossible for most of us to go as far as London to examine the types unrepresented here, yet thorough descriptive work cannot be done without seeing them. Apparently undescribed species are constantly being discovered as the result of intensive collecting, which should be published. Also many groups of Hawaiian insects need revision badly and the material is at hand for the work. The Museum could foster work of this kind by offering to finance the study of the types by specialists undertaking descriptive or revisory work, receiving in return for the outlay, the manuscripts for publication and insect material, including types, specimens compared with types, and series of specimens for reference to build up the collections. Some of this work could undoubtedly be undertaken by the Curator.

When the further entomologolical exploration of the Pacific, now in contemplation, begins to secure results, if, as this Society has strongly urged, the material obtained is turned over to the Museum for administration, the need for this advanced organization of its entomological work will become still more imperative and, indeed, this work should not otherwise be undertaken.

MARINE LABORATORY

The deed of trust by which the Museum was established empowers the Trustees of the Museum to establish at their discretion a laboratory for the study of marine life. Because the funds required for the construction, equipment and manning of such an institution would restrict the activities of the Museum in other directions, work in marine zoology has consisted largely of collecting and making available for study, the marine fauna of the islands. The hoped-for opportunity of enlarging this work in

Hawaii has come through a gift of a building to the College of Hawaii from the C. M. Cooke estate, and an arrangement with the College whereby the Museum becomes the depository of working and reference collections and a publication medium for students. Close cooperation is effected by combining the duties of the Director of the Marine Laboratory and the Curator of Marine Zoology in the Museum.

EXHIBITION HALLS

A museum is an educational institution which furnishes instruction by means of suitably labeled exhibits. The quality of the instruction offered is measured by the skill displayed in the arrangement of exhibits and in the wording of explanatory labels, rather than by the kind of material displayed. With this idea in mind the exhibition halls of the Museum should be given thoughtful consideration. Material not suitable for exhibition should be stored, and a systematic arrangement devised for that which remains in the exhibition halls. A complete re-labeling is also desirable.

The Museum is visited by many tourists but residents of Hawaii constitute a much larger group. The use of the Museum by citizens of Honolulu is large in proportion to the population and the visits during the year by Hawaiians (3090), Chinese (2238), Japanese (3756), and Portuguese (1205), indicate the estimation in which the institution is held by those who wish to take advantage of the instruction it has to offer. To accommodate those who are unable to visit the Museum during the working hours of the week, the halls have been open to the public on Sundays from 2:00 to 5:00 P. M. beginning September first. Mrs. Helvie reports that "the attendance on Sunday afternoons has been gratifyingly large". It is a pleasure to note that forty-six school classes in charge of their teachers made special studies of the collections.

PHOTOGRAPHIC LABORATORY

During the year, the large collection of photographic negatives belonging to the Museum has been catalogued and made easy of access by preparing a file of prints. These valuable photographs are now available for use by members of the staff and by visiting scientists. By the purchase of additional instruments and furniture, the photographic laboratory is adequately equipped for scientific purposes.

EXTRACTS FROM REPORTS OF CURATORS AND LIBRARIAN.

From the annual reports of members of the staff, transmitted to the Trustees, the following material has been taken:

Ethnology

A skeleton was found by Mr. J. Hedemann near Kilauea on a site which he had thought might have marked the place where part of Keoua's army was destroyed by showers of volcanic ash during the eruptions of 1789-90. To quote from Mr. Stokes:

> The skeleton was found in a reclining position under a shelter of detached boulders, protected from the direct rain and partly imbedded in the surface soil wash. In that position it overlooked Kilauea crater towards the fire-pit, Halemaumau. The bones were not in a good state of preservation, yet not too far gone to identify them as formerly belonging to a middle-aged female native. The method of preparation had also been according to native custom. Fragments of gourd had been found by Mr. Hedemann in the shelter, scattered by the surface wash, and probably belonged with the skeleton. No other implements were found.
>
> While women and children accompanied the army of Keoua, I do not believe that the interment dated back to his time. The condition of the bones did not suggest a period of more than 60 years and a search in the neighborhood of the spot revealed no trace of other skeletons.
>
> A survey of the vicinity suggested to me a possible solution of the problem of a native interment so distant from former habitations. In the talus nearby, there were (and probably always have been) many more suitable places for the hiding of a body, than that containing the skeleton, but I found a landmark which seemed to have a direct bearing on Halemaumau and the shelter, whereby the shelter could continue to be found with Halemaumau in its present position. The site of the cache would seem therefore to have been chosen with care and not by haphazard. The date of the concentration of Kilauea's activity in Halemaumau does not appear to be more than 70 or 80 years ago.
>
> In former days, bodies of dead devotees of Pele, and perhaps others, were disposed of by being thrown into the molten lava of the volcano, but the custom fell into disuse after the advent of the missionaries.
>
> So putting the few clues together,—mature native female, native preparation of the body, deposition many miles distant from habitations, site landmarked with reference to Halemaumau, situation overlooking the fire-pit with skeleton similarly placed, and the fact that the body was not thrown into Halemaumau—would suggest that the skeleton was that of another devotee of Pele, more recent than the days of the tabu, who wished her last

resting place to be as similar as possible to those of her predecessors as the altered customs would allow.

With the assistance of Dr. T. A. Jaggar and Mr. J. Hedemann, a search was made in the vicinity of Kilauea for the heiau of Oalalauo recorded only by Ellis (1823). No trace of ancient structures was found. Mr. Stokes writes:

> The conclusion was forced that the site must formerly have been on a portion of Waldron's ledge which has since fallen down.
>
> Near the city of Hilo, certain markings, sun, moon, stars, etc., previously reported as petroglyphs, were located and found to be natural markings in the lava. In their vicinity, however, true petroglyphs of human figures were found."

Accessions to the ethnological collection resulting from field work by members of the staff remain to be catalogued; those received through gift, loan and purchase are reported by the Curator as follows:

> Gifts during the year have been received from: Mr. and Mrs. James Campsie, Mesdames Hans Isenberg, M. T. Harvey, and H. B. Sinclair, Miss M. L. Purdon, Messrs. G. P. Cooke, A. Gouveia, J. Mann, James Munro, H. Schultz, and G. P. Wilder and the estate of the late James W. Robertson.
>
> Two of the gifts were particularly valuable. One of them was a carved wooden figure from these islands, carried to America by Rev. Reuben Tinker about 1840, and given to the Museum with other specimens by two of his descendants, Miss Purdon and Mrs. Harvey. The other, from Necker Island, a stone shaped as if for an image, was given by Mr. G. P. Wilder.
>
> Two collections of note were among the loans. The executors of the John D. Paris estate deposited a collection found some years ago by the late Mr. Paris in a cave on the famous burial cliff at Kaawaloa. It included two specimens which were previously unknown to us: a so-called dancing skirt, a number of detached cords of twisted human hair—and a ceremonial wand of peculiar pattern.
>
> The Catholic Mission of Hawaii deposited three wooden idols which have been in its possession for about forty years. Two of them are over six feet in height and were found in Waipio valley on Hawaii, the source locality of so many of the native traditions.
>
> There were comparatively few purchases of specimens during the year. The wooden idols found in the neighborhood of the famous temple of Pihana, on Maui, were bought, following information received from another friend of the Museum, Mr. Charles Wilcox of Maui.

PULMONATA

The Curator of Pulmonata reports that the number of specimens added to the collection during 1919 is larger than that of any previous year.

The Bryan collection of marine mollusca has been acquired by the

Museum. It has been carefully catalogued and contains 4572 catalogue numbers. Approximately 550 lots of shells loaned to Dr. Pilsbry by Mr. Bryan also have been added to the collections.

The catalogue of the Thwing collection, containing 38,688 specimens distributed over 7062 catalogue numbers, has been completed.

The collection of the late E. B. Giffard, presented to the Museum by Mr. W. M. Giffard in 1914, contains 4209 specimens distributed over 695 catalogue numbers, and includes two specimens of special interest. The first is a specimen of Ach. stewartii var. producta 31.6 mm. in length, which, as far as I know, is the longest specimen of the genus *Achatinella* that has been noted. The second specimen is a *sinistral* individual of *Achatinella lorata* (Fr.). As far as I know this is the only sinistral specimen of this species that has ever been collected.

The Gulick collection, purchased by the late C. M. Cooke in 1905, and later given to the Museum by your curator, contains 11,456 specimens distributed over 761 catalogue numbers. This is an important addition to our collection as it contains paratypes of a majority of Gulick's species.

The Cheatham collection, purchased by your curator in 1913 and later given to the Museum, contains 7062 specimens distributed over 174 catalogue numbers. It is rich in shells found in and about Wahiawa, Oahu.

It is expected that four other collections will be catalogued during the coming year, namely, the George Munro collection from Lanai; the W. H. Hoogs collection; the Richard A. Cooke collection; and the C. Montague Cooke collection . The first-named collection was purchased by the Museum, the others were given by their respective owners.

These collections added to the material on hand gives the Museum not only the largest but probably the most representative collection of Hawaiian Pulmonata in existence.

During the year, 89,194 specimens have been entered in the catalogue distributed over 8856 catalogue numbers. More than four-fifths of the specimens catalogued during the year were fresh material. About sixteen thousand specimens might properly be classed as fossils.

Valuable material has been received from the following individuals, to whom your curator wishes to express his thanks: Mrs. L. M. Dunbar, Miss M. Clough; Messrs. A. F. Judd, D. Thanum, C. F. Mant, A. Gouveia, J. C. Bridwell, J. S. Emerson, A. Knudsen, E. H. Bryan, F. Grinnell, J. Gilbert, W. S. Rycroft, C. N. Forbes, D. Fleming, G. H. Timberlake, K. Kahoana, and Rev. L. L. Loofbourow; Masters Murray and C. M. Cooke III.

Interesting fossil material has been given by Messrs. G. Munro (from Lanai), D. Fleming (from West Maui), and A. Gouveia (from Puuwaawaa, Hawaii). Most of this material has been sorted but the larger portion requires cleaning before it is ready for cataloguing.

On an expedition to the island of Molokai (February 4 to 21), in company with Mr. A. F. Judd, a conchological survey of the region west and north of Puuolelo Hill was carried out nearly to completion . As a result of this trip more than five thousand recent specimens and about fifteen thousand fossil specimens were added to our collection. There were obtained also a number of rare color forms of Partula mighelsiana whcih had not been previously recorded.

A second expedition in company with Mr. A. Lindsay and Master C. M

Cooke III was made to Kauai. Through the courtesy of the owner headquarters for nearly three weeks were made at the country house of Mr. H. P. Faye in the valley of Halemanu at an elevation of about 3500 feet. Over twelve thousand specimens, some of them among the rarest species collected in Hawaii, were the result of this trip.

BOTANY

An unusual amount of field work was accomplished by Mr. Forbes during 1919. Twelve trips on the island of Oahu resulted in adding about 125 sheets of specimens to the collections. From July to the end of the year, the field of operaiton was the island of Maui. To quote from Mr. Forbes:

> Through the kindness of Mr. S. A. Baldwin I was enabled to make headquarters at Ukulele, on the northern slopes of Haleakala at an elevation of about 5000 feet. From a camp several miles east of Ukulele I was enabled to visit a most interesting transition forest where there is an intermingling of species of plants characteristic of the upper rain forest and of the high upland zone. There was also a most interesting narrow zone with a bog flora. In ravines above this camp two species of Argyroxiphium were seen. Two camps were established within the crater of Haleakala. The first stop was in the Keanae Gap, a very wet locality but very interesting botanically on account of the close proximity of plant communities of recent lava, bogs, and rain forest. The second camp was near the large water hole opposite Oilipuu toward the Kaupo Gap. From this place trips were made out of the crater and down the north and northeast slopes. The rain forest is very dense in this section. The most interesting plant habitats are a series of cones and flats which extend down the mountain toward Hana. The first cone contains a lake surrounded with a zone of Carex; lower cones and flats have an open bog flora. In one of the bogs there occurs a very peculiar species of Wilkesia with a branching habit which may be a form of W. Grayana Hbd., but is probably another species of this rare genus. In the rain forests there is a beautiful species of Clermontia with reddish flowers which has not been described. On several trips down the Kaupo Gap, the most interesting plant observed is a fragrant flowered form of Viola Chamissoniana Ging. I returned to Honolulu with 2208 sheets of specimens. For aid in many ways while on this trip I am indbeted to Messrs. S. A. Baldwin, W. A. Field, H. A. Baldwin and Rosencranz.
>
> After examining the collections and attending to accumulated routine, on my return to Maui in November, a base was established at Hana and a camp in Kipahulu Valley at an elevation of 1600 feet. In olden times this valley was probably in a high state of cultivation as taro patches are numerous, and acres of land are covered with wild banana; but now the undergrowth is very dense, and old standing Koa trees indicate that the present growth is a secondary or even tertiary covering. Among the most interesting plants found here is a species of Cyrtandra distinguished from other described Hawaiian species by the peculiar shape of its calyx; and a species of Cyanea with orange colored blossoms. The Cyanea is identical with C. Copelandii Rock which was known only from a small area on the island of Hawaii. A short trip was taken toward Kaupo, going up the Pualaia

ridge and above Mokulau. At the latter locality there is a very fine forest of small yellow fruited guava, the trees varying from 30 to 60 feet in height. This land has been logged for fire wood and koa timber. I returned to Honolulu with 500 specimens. I am indebted to Mr. J. Fassoth and his sons for permission to camp at Kipahulu, and for help in many ways.

The source and number of specimens added to the Herbarium during the year are given below. Unless otherwise stated the specimens have been donated.

Dr. C. M. Cooke: from Oahu, 4; from Molokai, 1. Charles N. Forbes: from Oahu, 125; from Maui, 2769. Messrs. Fullaway and Giffard: from Hawaii, 10. Mr. A. F. Judd: from Hawaii, 1. Mr. George C .Munro: from Lanai, 14. Mr. Joseph F. Rock: Hawaiian Lobeliaceae (purchased), 112; from Kauai, 1. Mr. John F. G. Stokes: from Hawaii, 1. Mr. O. H. Swezey: from Oahu, 2. Mr. G. P. Wilder: from Kauai, 1. Total 3041 sheets.

ENTOMOLOGY

The Honorary Curator of Entomology, Otto H. Swezey, calls attention to the material collected during 1919 which, with the accumulated collection (4500 specimens) of the two previous years, makes a large amount of pinned material waiting to be sorted and classified.

The material collected during 1919 by various members of the staff is as follows:

E. H. Bryan: ridges and valleys near Honolulu, Oahu, 860 specimens; Ewa and Barber's Point, Oahu, 70 specimens; Waianae Mountains, Oahu, 50 specimens; Waihee and Iao Valleys, Maui, 170 specimens. C. M. Cooke, Jr.: Kokee, Kauai, 6 specimens. Charles N. Forbes: Haleakala, Maui, 22 specimens. John F. G. Stokes: Honaunau, Kona, Hawaii, 180 specimens. Otto H. Swezey: Glenwood, Hawaii, 142 specimens; Kilauea, Hawaii, 625 specimens; Hualalai and Kona, Hawaii, 1250 specimens; ridges and valleys near Honolulu, Oahu, 500 specimens; Ewa and Barber's Point, Oahu, 140 specimens; Waianae Mountains, Oahu, 240 specimens. John W. Thompson: Honolulu, Oahu, 20 specimens. Total 4275 specimens.

Besides this lot of material, quite a quantity was purchased from Mr. John A. Kusche of San Francisco, who had spent a few months collecting insects in the region of the head waters of the Waimea river, Kauai. Of this material 2000 specimens (chiefly moths) have been pinned up, and partially sorted and determined. Seventy-eight specimens of rare and interesting butterflies and moths of the western United States, were also received from Mr. Kusche.

LIBRARY

During the absence of the Librarian, Elizabeth B. Higgins, only routine work associated with cataloguing, binding, caring for exchanges, and distribution of publications, has been carried on. Several manuscripts, including the journal of Lucia Ruggles, have been copied for preservation. Accession to the library by gift, purchase, and exchange during 1919 will be incorporated in the report for 1920.

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OCCASIONAL PAPERS

OF THE

BERNICE PAUAHI BISHOP MUSEUM OF POLYNESIAN ETHNOLOGY AND NATURAL HISTORY

Vol. VII, No. 9

WITH FIGURES I-VI

EDIBLE MOLLUSCA OF THE OREGON COAST

BY

CHARLES HOWARD EDMONDSON

HONOLULU, HAWAII
BISHOP MUSEUM PRESS
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Acknowledgment is due the United States Bureau of Fisheries under whose direction investigations recorded in this report were conducted during the period from August, 1917, to May, 1919, inclusive.

The Author.

Edible Mollusca of the Oregon Coast.[1]

By Charles Howard Edmondson.

INTRODUCTION.

The Oregon coast from the mouth of the Columbia River to California presents an exceedingly varied contour. Low, flat, sandy beaches alternate with rugged headlands while the shore line is indented by numerous bays and inlets of greater or less extent. A number of rivers of considerable size, draining the Coast Range Mountains, flow into the Pacific within the boundaries of the state, their waters influenced by the daily tides for several miles from the ocean. Most of them expand into broad, shallow bays near their mouths and some of them are characterized by extensive mud flats on one or both sides of the channel which make ideal habitats for numerous forms of marine or brackish water organisms. In many places the coast is paralleled by fringing chains of rocks representing remnants of a former shore line, now serving as footholds for such fixed organisms as have become adapted to the full sweep of the waves.

As the physical features of any coast line determine the types of animals and plants that are distributed along it, so the organisms of the open beaches differ considerably from those found in the protected bays and mouths of rivers or along the rocky shores.

The habitat conditions in the tidal zone along the northwest coast are such that numerous lamellibranchs have become established and are maintaining themselves more or less successfully. Of this number there are about a dozen, besides the western oyster,[2] Ostrea lurida Carpenter, which have already been recognized, to some extent at least, as fit for human food.

The following list of clams and mussels represents the bivalves, exclusive of the oyster, of the Oregon coast which have entered into the food economy of the people of the state in some slight degree: Siliqua patula Dixon, commonly known as the "razor clam"; Mya arenaria Linnaeus, the "long neck clam" or "eastern mud clam"; Paphia staminea (Conrad), called the "little neck clam" or "hard clam"; Schizothaerus nuttalli Conrad, locally known as the "Washington clam" or the "great blue clam"; Saxidomus giganteus Deshayes, sometimes called the "butter clam", wrongly called the "quahog" at Netarts Bay; Cardium corbis Martyn, universally known as the "cockle"; Macoma nasuta Conrad, the "bent nose clam", called at Newport the "oyster clam"; Pholadidea penita (Conrad), a rock borer, commonly but wrongly called the "rock oyster"; Mytilus edulis Linnaeus, the smaller and smoother of the two common sea mussels, and Mytilus californicus Conrad, the larger and rougher sea mussel. Besides these may be mentioned species of pecten which undoubtedly exist off the coast of Oregon, beyond the low tide line, but nothing is known at the present time regarding the distribution of the beds or their abundance.

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[1] The investigations recorded in this paper were conducted while the writer was a member of the teaching staff of the University of Oregon.

[2] For a discussion of the oyster see page 23 of this paper.

That the Indians made extensive use of clams and mussels along the northwest coast even before the advent of the white man is a matter of general knowledge. Along the Oregon shore, from Seaside in Clatsop County to southern Curry County, great heaps of shells or "kitchen middens" are common sights. Many of them are very old, some are covered with earth and vegetation, and others with shrubs and trees of considerable size. Without thoroughly investigating the contents of these mounds it was observed that they are composed primarily of shells of types of molluscs found living in the same vicinity at the present time.

Although there is a somewhat general apathy of people toward fresh clams and mussels as food, probably due largely to unfamiliarity with them, and a very universal tendency to neglect things that are commonplace, the writer has observed a marked increase in the use of these sea products by the people of the northwest during the past few years. Statistics relative to the shore fisheries of clams and mussels of the Pacific coast states for the year 1915, as recorded by Radcliffe[3] in a report of the United States Bureau of Fisheries, are as follows:

California.	Value.
Hard clams	$ 17,583
Soft clams	18,107
Mussels	2,326
Total	$ 38,016

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[3] Radcliffe, Lewis. Fisheries Industries of the United States. Appendix X to th Report of the U. S. Commissioner of Fisheries for 1918. Document No. 875, p. 1 167.

Oregon.	
Razor clams	$ 10,900
Soft clams	3,041
Total	$ 13,941
Washington.	
Hard clams	$ 12,191
Razor clams	56,446
Soft clams	150
Mussels	83
Total	$ 68,870
Total for the three states	$120,827

The same report indicates the following value of canned clam products of the Pacific coast states for the year 1915:

	Value.
Oregon.	
Clams and clam juice	$ 40,509
Washington.	
Clams and clam juice	218,550
Total	$259,059

Although not setting forth the value of the canned molluscan product of California for the year 1915, the report states "that considerable quantities of abalone were canned in San Diego and Monterey Counties and a small pack of mussels was put up in Del Norte County".

The actual importance of clams and mussels as food products is much greater, however, than indicated by the census report. On the Oregon coast large quantities of clams are consumed locally, no record of which is kept. Clam digging is an attractive employment for crowds of visitors who are fortunate enough to be able to spend a few days or weeks at the beaches. In recent years many have taken advantage of the opportunity offered while at the beach and have canned a winter's supply of clams for their own use. A cannery designed primarily for the purpose of putting up minced clams has been in operation at Tillamook City, Oregon, for a number of years. The activity of the enterprise, however, is dependent upon the inclination of the diggers to supply the cannery with clams. During the salmon fishing season it is practically impossible to get men to dig clams, as higher wages can be made in the fishing boats.

At nearly all of the towns on the Oregon coast where clam beds are accessible there are one or two men who devote at least a portion of their time to digging clams for local demands or nearby markets. Fish markets usually handle supplies of fresh clams for the convenience of the local trade.

Through the courtesy of Dr. A. D. Howard, of the United States Biological Station at Fairport, Iowa, some careful tests were recently made by a factory of that locality to determine the possibility of the utilization of the shell of Saxidomus giganteus in the manufacture of buttons. The conclusion was that this shell, like those of most marine molluscs, is too hard and brittle for that purpose.

GENERAL DISTRIBUTION OF THE EDIBLE CLAMS AND MUSSELS ON THE OREGON COAST.

1. Siliqua patula Dixon.

Among the bivalves inhabiting the ocean beaches of our northwest coast, which have become recognized as food products either locally or in more distant markets, the razor clam is, in the opinion of many, of chief value. This clam is still abundant on the Washington coast north of the mouth of the Columbia River in spite of the inroads made upon it by the canneries. A seasonal restriction limiting the activities of the clam canneries to a few months during each year has, no doubt, been a factor in stabilizing the razor clam on the Washington beaches.

On the Oregon coast Siliqua patula has for many years maintained itself in abundance north of Tillamook Head in Clatsop County where large quantities of the clams may still be taken during the year at periods of low tides. Until about six years ago beds of razor clams of considerable size were known to exist at many points throughout the entire coast of Oregon. There apparently occurred, however, a sudden depletion of the species along the sandy beaches south of Tillamook Head, a satisfactory cause for which has not been ascertained. It is very probable that many influences contributed to this depletion. The changing character of the beaches may account for its total extermination in certain localities. Some beds of clams of considerable extent are known to have been either destroyed or forced to migrate into deeper water by the sand in which they lived being washed away by the action of the waves, while others may have been smothered by the sudden addition of sand. Continual digging together with possible unfavorable spawning seasons may, in other instances, have depleted the species.

That the razor clam has never been wholly extinct in recent years south of Tillamook Head is evidenced by the fact that a few individuals have been taken each year in scattered localities along the coast. Whether the clam is able to migrate and establish itself in deep water below the line of low tide when unsuitable conditions arise in the more shallow water of the littoral zone is at the present time unknown.

During the summer of 1919 it was apparent that the razor clam was increasing in numbers at certain points along the Oregon coast, and its reappearance was noted in several localities where it had not been observed for a number of years. Beaches south of Tillamook Head from which the razor clam has been taken in small numbers during the past two or three years are located as follows: north of Netarts Bay; within Netarts Bay; between Netarts Bay and Cape Lookout (Figure I); north of Yaquina Head; Agate Beach; between Yaquina and Alsea Bays; north of Heceta Head and north of the mouth of the Siuslaw River. Possibly the species may have been taken at other, unreported points. The next few years may see this valuable clam establishing itself in increasing numbers on certain beaches where it was once very abundant. In such localities it should be unmolested for a year or two in order that it may increase in such numbers as to assure a stability of the species.

A state law prohibiting the shipment of clams from Clatsop County during the period from June 20th to September 20th of each year has been in effect for a number of years. This restriction does not, in the opinion of the writer, and apparently was not intended to serve as a material check upon the actual taking of clams during the closed season mentioned above. The tourist season at the popular resorts of Seaside and Gearhart is at its height during the summer months. A greatly increased population at the beaches results in a very great destruction of both mature and immature razor clams for local consumption. Inexperienced diggers often crush the shells and fail to take the animals from the sand, or mutilate them in their strenuous efforts and cast them away as useless. Disregard of size of clams taken results in the destruction of many small individuals which should have been given a chance to mature. This constant strain upon the species has probably been offset, however, by repeated successful spawning seasons, as the clams on this beach are about as plentiful at the present time as in previous years. Nevertheless, there is little in the present restrictions and practice to serve as a guarantee against possible depletion of the species in the future.

2. Paphia staminea (Conrad).

The "little neck clam" is frequently seen in the markets of Portland and other inland cities of the northwest, the greatest supply coming from the gravel beds of the southern shores of Puget Sound. The species is well distributed, however, along the northwest coast and in Oregon occurs in the larger bays as Tillamook, Netarts, Yaquina and Coos (Figures I, II, IV). It is not the dominant species in any of these localities but may be taken in considerable numbers from the gravel beds of Netarts Bay and from the mud flats of Coos Bay south of Empire City. Dredging operations in 1919, for the purpose of deepening the channel of Yaquina Bay, largely destroyed the clam beds on the north shore of the bay above the town of Newport. Among other species commonly found here was Paphia staminea. This species is not found in sufficient quantities in any locality on the coast of Oregon to supply more than a limited local demand.

3. Schizothaerus nuttalli Conrad.

The "Washington clam" is a species of wide distribution on the west coast. It thrives well and reaches a large size in Washington and Oregon where the species has taken possession of nearly all of the prominent bays. On the Oregon coast it is especially abundant in Netarts Bay, where it is the dominant species, being well protected in the gravel beds. This clam is also abundant in the mud flats of Yaquina River on both sides of the channel between the towns of Yaquina and Newport. The species is a conspicuous one in the coastal waters of Oregon, where conditions are favorable for it, as far south as Coos Bay (Figures I, II, IV). Winchester Bay at the mouth of the Umpqua River is well supplied with this clam but it is entirely wanting in the tide flats of the Siuslaw River.

Schizothaerus nuttalli is very short lived when removed from the water and, therefore, is chiefly used as food locally. Quantities of this species, however, are canned by tourists on visiting the coast during the summer and carried away for future consumption. This is also one of the species made use of by the cannery at Tillamook City in the preparation of minced clam products.

4. Mya arenaria Linnaeus.

The "long neck clam," which was transported from the Atlantic coast many years ago, probably with oyster spat, has become well adapted to conditions in many localities on the Pacific coast where it inhabits the mud flats of bays and rivers often advancing up the latter several miles from the ocean but always remaining within the influence of salt water. The species has established itself on the Oregon coast in nearly all of the protected bays and many of the rivers from Coos Bay northward. In the Siuslaw River, between the towns of Florence and Acme about 4½ miles from the ocean, are very extensive beds and the finest specimens of Mya arenaria that have come under the writer's observation in the northwest (Figure III). Here on both sides of the channel, but mostly on the north shore, large areas of mud flats are exposed during even a moderately low tide. Many of the shells of clams taken here measure more than six inches in length. This locality supplies the local demand as well as the markets of the upper Willamette Valley towns. Although the species has prospered in the Siuslaw River since its introduction about forty years ago, there are certain local conditions which may in time work toward its depletion. The North Fork, a tributary of the Siuslaw River of considerable size, pours its fresh waters, after a period of heavy rainfall, over the tide flats occupied by the clams. During times of unusually high water the tide flats are sometimes flooded continuously for several weeks at a time permitting much silt and sand to be deposited on the surface of the clam beds. During the latter part of December 1917 and throughout January, 1918, excessive rainfall caused exceedingly high water in both the Siuslaw River and its tributaries, as a result of which the clam beds were washed by comparatively fresh water for nearly four weeks. When examined at the end of January 1918, a very high percentage of the young clams, then from 20 to 30 mm. in length, were dead. They were alive and in good condition when examined in December 1917 just before the heavy rainfall. A dense layer of fine sand from ½ in. to 2 in. deep covered the surface of the clam beds after the recession of the high water, smothering, in my opinion, the younger and weaker individuals. Clams attaining a length of 50 mm. or more apparently were able to withstand these unusual conditions and survived but practically all of the smaller individuals were destroyed.

Beds of Mya arenaria of considerable size are found in the mud flats on the east side of Coos Bay opposite North Bend, from which source local markets are supplied. The species also inhabits certain tide flats of the Yaquina River above the town of Yaquina several miles from the ocean, and has gained a foothold in other bays and rivers along the northern half of the Oregon coast.

5. Saxidomus giganteus Deshayes.

Although this species has been taken at several points along the Oregon coast and its shells may be found scattered along the beaches, it has accumulated in but one locality in sufficient numbers to be considered of economic importance. This clam is a characteristic one of Netarts Bay where formerly it was recognized as an abundant species (Figure I). During recent years, however, a gradual depletion of the species has been going on, whether due to demands of local consumption or other causes has not been ascertained. The clam has never been widely marketed from Netarts Bay owing to the lack of transportation facilities from that locality to inland points, but it is a popular species for local use.

Saxidomus giganteus has also been taken in small numbers from the gravel of the north shore of Yaquina Bay. As a result of recent dredging operations in that bay there is, however, scarcely a possibility that the species may have escaped extermination. The species also occurs at Sunset Bay and no doubt may be found along the open beaches in other localities. It is characteristic of the ocean beaches or the sand and gravel beds of bays with very direct circulation from the ocean.

6. Cardium corbis Martyn.

This species is a common form in the larger bays and on the tide flats of some of the rivers of Oregon. It may be considered an abundant species in Tillamook Bay where it furnishes a source of supply for the cannery in Tillamook City which operates intermittently during the year. The species is also abundant on the mud flats of Yaquina River between the towns of Yaquina and Newport, especially on the south side of the channel. It also occurs in Netarts Bay, Coos Bay and other localities along the coast being commonly associated with Schizothaerus nuttalli and Paphya staminea (Figures I, II, IV).

7. Macoma nasuta Conrad.

The "bent nose clam" not only does not find its way into the markets of the northwest but is usually neglected by those who have access to the beaches and frequently indulge in sea foods of the molluscan variety. The species, however, is a familiar one along the Oregon coast. Until recently it was very abundant in the gravel beds of the north shore of Yaquina Bay (Figure II). In this locality, where it is known as the "oyster clam," it is considered of excellent quality by the few who make use of it as food. Dredging operations in Yaquina Bay, as mentioned above, have here quite depleted the species along with others. In 1919 the clam could still be obtained there but in fewer numbers than in former years. It may, however, regain its previous abundance as it is not much sought after and rarely disturbed. The species occurs in other localities both north and south of Yaquina Bay but its economic value as human food on the northwest coast may be considered almost negligible.

8. Pholadidea penita (Conrad).[4]

Distributed northward and southward on the Oregon coast from Nye Beach as the locality of greatest abundance is the rock borer, locally known as the "rock oyster," a bivalve mollusc of recognized food value. The sloping ledges of soft rock paralleling the shore line just off Nye Beach abound with this species. They can be reached during a moderately low tide and with an extremely low tide large areas are exposed. The species is taken at other points along the Oregon coast both north and south of this locality, but is nowhere else so easily accessible or obtained in such abundance. The mollusc is used as food quite extensively locally, especially during the summer months when many people visit this beach. Whether the species is being depleted or not cannot be ascertained at this time. Naturally great destruction of young and immature individuals occurs during the process of breaking the larger specimens out of the rocks. The inshore ledges of rock also seem to be quite well worked over but until more is known of the life history and rate of growth of the species nothing definitely can be asserted as to its stability or depletion.

9. Mytilus edulis Linnaeus.

This smaller and smoother of the two common sea mussels occurs along the entire Oregon coast wherever conditions will support it. It is not only found along the open ocean from Tillamook Head southward but is common in protected bays and frequently finds its way up rivers several miles from the ocean but still within the influence of salt water. It thrives well in the Siuslaw River four miles from its mouth.

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[4] The Oregon coast is also within the range of a closely related species, Pholadidea ovoidea (Gould). A very large rock borer, probably Parapholas californica (Conrad), has been taken by the writer on the north shore of Yaquina Bay. It is a negligible factor, however, even in local food consumption, due to its scarcity.

Although in unlimited quantities along the coast this species and the following one, aside from very insignificant local consumption, have not yet come to have any place in the list of human foods of the northwest.

10. Mytilus californicus Conrad.

The large, ribbed mussel is characteristic of the rocks and headlands which face the ocean receiving the full sweep of the waves. It is attached to the rocks just below high tide and seems to thrive best where the surf is strongest. The species is a common form on the rocky shores throughout the coast of Oregon from Tillamook Head southward. It is especially abundant north of Siletz Bay at a point opposite Devils Lake. Here chains of rocks which parallel the shore and are exposed at low tide have vast areas literally covered with this mussel. It is also very abundant between Netarts Bay and Cape Mears (Figure I), as well as in numerous other localities near the central and southern portions of the coast.

11. Pecten sp.

Whether pectens are well distributed off the northwest coast has not been fully determined. They have been dredged in considerable quantities from Puget Sound and have occasionally been taken off Newport on the Oregon Coast. They are, however, seldom if ever seen in the markets of the northwest and apparently little effort has been made to develop this phase of the fishing industry. To determine the possibilities of the pecten fisheries extensive surveys should be made along the entire coast and proper gear provided for the boats.

Those familiar with the importance of these bivalves on the Atlantic coast would welcome any efforts to add the pectens to our list of sea foods in the northwest.

MARKET POSSIBILITIES FOR FRESH PRODUCTS.

In order that clams and mussels may be satisfactory and safe foods they should be obtained from uncontaminated localities and be prepared as soon as possible after having been taken out of their natural surroundings. There is no doubt that clams and mussels may be contaminated by growing in water polluted by sewage, or if too long out of water the micro-organisms they contain may release toxic elements which render the shellfish not only unfit but highly dangerous as food. Clams or mussels taken from near the mouths of sewers or rendered unsafe by other causes should not be used, or permitted in markets for sale any more than spoiled produce of other kinds.

If, however, they are taken from sanitary localities and are properly prepared soon after digging, or after having been adequately preserved by cold storage methods, clams and mussels will prove to be most excellent and nourishing food.

1. Mya arenaria Linnaeus.

Numerous experiments have resulted in the conclusion that of the bivalves mentioned above this clam has the greatest tenacity of life and will remain in an edible condition longer than any of the other species, after having been removed from the water. By icing the clam it has been kept alive for a period of 14 days after its removal from salt water. This would permit of its transportation for a considerable distance from the coast if the same were made under proper conditions. If kept at low temperature this species may remain in fit condition for food for as long as a week after having been taken out of the water.

Mya arenaria is abundant in the Siuslaw River and Coos Bay both of which are in direct connection by railroad with Willamette Valley points. The species may be expressed from the coast to many inland towns or even to Portland the same day it is taken from the water and will remain good for the markets for several days after reaching its destination.

2. Siliqua patula Dixon.

The markets of Portland are supplied during the open season with this species from the Clatsop County beaches, 4½ to 5 hrs. by express, or from the Washington beaches requiring about the same time for transportation. If shipped at night the clams are in good condition for markets the next day, but they do not endure so long out of water as does Mya arenaria. If iced the razor clam will remain in an edible condition for about 36 hours. It is not practical, therefore, to ship this species any great distance from the coast and expect it to reach its destination in a marketable condition.

3. Schizothaerus nuttalli Conrad.

On account of its poor shipping qualities this clam is not a good one for other than local markets. The shell is thin and fragile being easily broken in transportation, and the clam is short lived after its removal from the water. The species will live three or four days if kept at low temperature but should be prepared for food as soon after digging as possible. It may be shipped from Coos Bay to Willamette Valley markets in from 8 to 12 hrs. by express and can be recommended as food the next day but seldom after that time. Shipments from Netarts Bay to Eugene, Oregon, not less than 15 hrs. by express, made during the winter months, sometimes came through in fair condition and at other times all of the clams perished on the way. In none of these shipments were they iced.

4. Paphia staminea (Conrad).

The "little neck clam" is one of the best of shippers due to the hardness of its shell, and is also a fairly long lived clam when removed from the water. Quantities of this species are to be found in the Portland markets being expressed from Olympia, Washington. It is often shipped as far south as Eugene, Oregon, from the southern shores of Puget Sound, reaching its destination in good condition and remaining in an edible condition for several days, sometimes lasting a week if placed on ice. The species is not found in sufficient numbers in any locality along the Oregon coast to make it worth while to attempt to supply the demands of a regular market. It is used quite freely, however, for local consumption wherever it can be obtained.

5. Cardium corbis Martyn.

This species is very short lived when removed from the salt water and, although it has a very hard shell, is a very poor market clam. It occurs in considerable abundance in both Tillamook and Yaquina Bays but its poor shipping qualities would make impractical attempts to market the species in a fresh condition at any great distance from either of the above localities. Its food value is chiefly a local one, although it is one of the chief sources of supply for the cannery at Tillamook City.

6. Saxidomus giganteus Deshayes.

Netarts Bay is the only locality on the Oregon coast in which this species can be obtained in any numbers and even there in 1919 the clam had become so depleted that comparatively few could be had. At the present time the supply is too meager to meet the demands of local consumers and the nearby markets of Tillamook City. This clam is one of the best of shippers, having a very hard, thick shell and is fairly long lived, the valves of the shell closing tightly preventing rapid evaporation of water. Measures should be taken toward the cultivation of this species in Netarts Bay and elsewhere, as it represents one of the best of our edible clams.

7. Mytilus edulis Linnaeus.

8. Mytilus Californicus Conrad.

It has been the experience of the writer, as well as of others, that sea mussels cannot be preserved long in a fresh condition after being removed from the water. Field[5] was not able to keep Mytilus edulis in an ice chest longer than 24 hrs. but suggests that improved methods could probably be devised for preserving the species in cold storage for a sufficient length of time to enable it to reach inland markets.

With the indirect transportation facilities from Oregon coast points where the sea mussels are in greatest abundance, there is slight possibility of these species becoming important fresh food products of inland markets in the near future. According to Field, cited above, the pickling of sea mussels has become an industry on the Atlantic coast, and as indicated by the census report, referred to in the introduction of this paper, they are being canned to some extent in California. The mussels of the Oregon coast have not found their way into the markets in any form and are used in very insignificant quantities by local consumers.

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[5] Field, I. A. The Food Value of Sea Mussels. Bulletin of the U. S. Bureau of Fisheries, Vol. 29, 1909, Doc. No. 742, Feb. 24, 1911.

As it is evident that few of the clams and sea mussels of the northwest coast can be placed on inland markets as fresh products, it would seem, therefore, that methods of converting them into articles of trade locally might be employed to advantage. In the opinion of the writer, the clams of the Oregon coast are of insufficient quantity to enable any of the species to long stand the strain of being subjected to the usual demands of a cannery running at full capacity throughout the year and utilizing only these products. It is believed, however, that canneries of more general character, if the cost of equipment would permit, capable of handling not only clams and mussels but fish, berries and other produce during the seasons of the year, might be established and run on a paying basis in the vicinity of Netarts Bay, Yaquina Bay, on the lower Siuslaw River and on Coos Bay. Fish canneries are in operation at some of these points but none, I believe, are handling shellfish at the present time.

SPAWNING PERIODS AND GROWTH.

1. Siliqua patula Dixon.

As a result of microscopic examinations of the sex organs at different periods of the year it is evident that the razor clam spawns during the summer months. The exact limits of the period, however, have not been definitely determined at this time.

An examination of male clams on January 28th revealed the condition of the spermaries characteristic of this species during the winter months. Spermatocytes were observed to be in various stages of development but no mature spermatozoa could be detected. On May 10th spermatozoa were fully formed but showed no activity at this time. On July 22nd, however, there was evidence that the species was in the midst of the spawning season. Spermatozoa were well formed, mature and very active. As in case of many other clams, ova may be detected in the females at any period of the year; on July 22nd, however, they were very large and well rounded, their maturity evidently corresponding with the maturity of the spermatozoa. On examining males and females September 4th it was observed that the bodies of both were spent, indicating that the spawning season was past.

After having examined the ovaries and spermaries of the razor clam throughout several successive years, it may be safely concluded that the species on the beaches of Clatsop County, Oregon, begins spawning in the early summer, probably about June 1st, and continues throughout July and August (Figure V, 1, 2, 3).

There are reasons to believe, however, that the period of spawning may vary somewhat from year to year. On September 4th, 1918, of the small razor clams found in the sand there were few under 30 mm. in length of shell, probably indicating a relatively early summer spawning for the species. On September 15th, 1919, however, small clams ranging from 8 to 20 mm. in length were very abundant, which may indicate a difference in the growing conditions during the two summers or that the spawning season was somewhat later in 1919 than in the preceding year.

2. Schizothaerus nuttalli Conrad.

Microscopic examinations of the ovaries and spermaries of the "Washington clam," conducted during the summer, winter and spring months, indicate that the spawning season of the species on the Oregon coast takes place during February and March (Figure V, 4, 5, 6).

Early in February well developed spermatozoa begin to appear in the spermaries with some activity noted. On March 26th, 1918, spawning was still in progress, the bodies of both males and females being well filled with the sex elements, the spermatozoa showing great activity and the ova evidently in a state of maturity. On March 29th, 1919, however, both male and female clams were in a spent condition. There is probably some variation in the duration of the spawning season from year to year and, no doubt, a like variation under different conditions. My observations were made at Newport, Oregon, where the clams were taken from the protected tide flats of the Yaquina River.

The examination of males on July 31st did not reveal the presence of formed spermatozoa. It is quite clear that there is no summer spawning of this species on the Oregon coast. In September 1918, small clams about 50 mm. in length were quite abundant in the gravel beds of Netarts Bay. Although the rate of growth of Schizothaerus nuttalli has not been determined, it is very probable that these small clams may have resulted from the spawn of the previous spring.

3. Paphia staminea (Conrad).

There is some evidence to believe that the "little neck clam" has both a spring and a late summer spawning season on the Oregon coast. Examinations made at Newport on March 30th revealed ova and spermatozoa apparently in a state of maturity, the latter very active (Figure V, 7, 8, 9). The condition of the bodies of both males and females indicated that the spawning period was approaching. On September 22nd of the same year the species was examined at Coos Bay and found to be in a condition identical with that observed at Newport in March. The ova were to all appearances fully matured and the spermatozoa were very active.

On July 31st, 1918, well formed spermatozoa were found in this species at Netarts Bay but they were in a resting condition. I have not examined the species at Newport in September or at Coos Bay in March. In both localities, however, the clams were taken within protected bays and the variance in temperature of the two places cannot be great. It would appear, therefore, from our present incomplete knowledge, that Paphya staminea may spawn in both the spring and late summer seasons on this coast.

4. Mya arenaria Linnaeus.

The reproductive organs of this clam have been examined each month throughout the year. In the Siuslaw River the species spawns during the late summer the period closing about the middle of September. Fully formed spermatozoa may be detected about the first of July while usually by the 15th of September the bodies of both males and females are in a spent condition. Later in the year and during the winter and spring months young, immature ova and spermatocytes in various stages of development are present. The height of the spawning season in this locality seems to be the latter part of August and the first week in September (Figure V, 10, 11, 12).

By the latter part of November young clams from 10 to 25 mm. in length may be found in the beds just under the surface of the mud beneath patches of eel grass. The eel grass serves as a hold-fast for the embryonic clams which cling to it by their byssus threads until they are of sufficient size to dig into the soft mud.

Kellogg[6] reports that the breeding season of Mya arenaria in Buzzards Bay extends from the latter part of May to the early part of August, reaching its height in late June or early July. Local conditions probably determine the spawning period of this species in each locality.

The rapid growth of Mya arenaria, especially when young, and the demonstration of the success of replanting depleted areas make this species a suitable one for experiments in clam culture. Rapidity of growth depends, naturally, upon a number of conditions such as the character of the bottom, currents, exposure between tides, amount of food, etc. It has been shown by Kellogg, as cited above, that clams from 1 to 1½ in. long when planted may reach a fair marketable size in one year's time.

Nightingale[7] has pointed out that clam culture will insure a uniform supply and restore depleted beds to their former productivity, and that clams artificially planted under favorable conditions will mature in from 9 to 14 months while in natural beds from 2 to 3 years may be required.

Measures should be taken to replant portions of the beds of

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[6] Kellogg, J. L. Conditions governing existence and growth of the soft-shell clam (Mya arenaria). Part 29, Report of the U. S. Commissioner of Fisheries for year 1903, pp. 195-224.

[7] Nightingale, H. W. Concerning the Mortality of the Soft Clams at Essex, Mass. Economic Circular No. 16, U. S. Bureau of Fisheries, April 8, 1915.

Mya arenaria in the Siuslaw River which in 1919 had become depleted. Judging from the experience of the past few years, the most suitable time for artificial culture in this locality is in November or early December, if high water does not prevent, when large numbers of small clams from 10 to 25 mm. in length are to be found near the surface of the mud under patches of eel grass. These should be replanted in depleted areas, the thinning out process permitting them to mature more rapidly than would be possible in the aggregated groups in which they are naturally found. The planting may be accomplished very rapidly by the use of a sharp pointed stick for making shallow holes in the mud into which the young clams are dropped siphon end up.

5. Cardium corbis Martyn.

The "cockle" is the only hermaphroditic clam coming under the observation of the writer on the Oregon coast. During the late fall and winter months it is rarely possible to distinguish the ova or spermatozoa in this species. The sex elements begin to appear in the spring, the spermatozoa being observed as early as March 29th at Newport, Yaquina Bay. Development of ova and spermatozoa continues through the summer, spawning apparently occurring from about the middle to the latter part of September. On September 22nd ova appeared to be mature and the spermatozoa were in a state of great activity. From October to March the reproductive organs pass through phases of reorganization, the oocytes and spermatocytes becoming differentiated in the early spring. Histological sections through the reproductive organs clearly show the spermaries massed about the ovaries (Figure V, 13, 14).

6. Pholadidea penita (Conrad).

An examination of the spermaries of males of this species on March 27th at Nye Beach revealed all stages of development, in the same individual, from early spermatocytes to fully developed spermatozoa. No activity of the latter, however, could be detected. On August 19th observations in the same locality indicated large, well developed ova and apparently mature spermatozoa but no activity of the latter. Insufficient observation through the year renders impossible an assertion, at this time, regarding the spawning season of this species on the Oregon coast (Figure VI, 1, 2, 3).

7. Saxidomus giganteus Deshayes.

The spawning period of this species has not been fully determined for the Oregon coast. Sections of the ovaries prepared in March, June and November show little difference in the development of the ova. Spermatozoa have been found to be fully formed in March, June and November but in no case have I observed them in an active condition. A closer examination throughout the year will be necessary to make a positive statement regarding the spawning season of this species.

The ova of Saxidomus are characterized by a very thick membrane which envelops each egg, and the large amount of connective tissue separating the follicles of the ovary are also distinctive features. The spermatozoa are elongate, curved, similar to those of Paphya staminea (Figure VI, 4, 5, 6, 7).

8. Macoma nasuta Conrad.

The spermatozoa of this species are mature and active during the latter part of March on the Oregon coast. Sections of the ovaries at this time indicate, however, a considerable number of immature ova. Spawning probably occurs in the late spring or early summer months (Figure VI, 8, 9).

9. Mytilus edulis Linnaeus.

On March 25th, at Yaquina Bay, the mantles of this species were found to be well filled with fully developed spermatozoa none of which, however, were in an active condition. Ova at this time were immature. Examination of the species at Sunset Bay on September 23rd indicated that the spawning season had just passed. At this time the bodies and mantles of the mussels were very soft and watery being in a spent condition. In both of these instances the specimens were taken from localities with exposure to the open ocean. The evidence seems to indicate that the species spawns on the Oregon coast, under the above conditions, in the late summer. (Figure VI, 10, 11, 12).

Field[8] is of the opinion that the spawning period of Mytilus edulis on the northern Atlantic coast is determined largely by conditions of weather, specimens inhabiting protected bays spawning much earlier than those more exposed to the colder waters.

10. Mytilus californicus Conrad.

Examinations of this species have not been made with sufficient regularity throughout the year to determine the spawning season on the Oregon coast.

THE OYSTER SITUATION.

The western oyster, Ostrea lurida Carpenter, has become an important fisheries product of the state of Washington but is somewhat neglected on the Oregon coast. Along the Oregon shores there are no great water areas comparable to the lower Puget Sound, Gray's Harbor and Willapa Bay in Washington which furnish very suitable environments for oyster farming. The general belief that localities on the Oregon coast favorable to the propagation of oysters are very limited has contributed to the lack of development of this phase of the fisheries industry. For many years the Yaquina River has been the only source within the state supplying marketable oysters and the annual yield from these beds is very small. A report of the U. S. Bureau of Fisheries[9] places the total market value of oysters from the Yaquina River for the year 1915 at $725.00. Statistics for more recent years, if they were available, would doubtless show a material increase in the output and steps have been taken by the State Fish and Game Commission looking toward further improvements of conditions in the Yaquina River beneficial to the oyster industry.

The beds are located near the town of Oysterville (Figure 2) and lie, for the most part, in the channel of the river. Much eroded sediment is carried down the river resulting in the necessity of frequent tonging of the beds to prevent the oysters from being smothered. Conditions for growth, however, seem to favor the oysters in this river as they reach a good size and a greater or less amount of spat is caught each season. Practically all of the oysters from the Yaquina beds are shipped in the shell to Portland's markets.

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[8] See footnote page 16.
[9] See footnote page 4.

A closed season from May 15th to September 15th covers, in a general way, the spawning period of the oyster in this locality. Some fishermen, however, believe that spawning begins as early as May 1st and favor an earlier closed season.

Many years ago an attempt was made to establish the eastern oyster in the Yaquina River. Plantings were made and careful observations kept by the state biologist but the results were not encouraging and the project was later abandoned without assurance of the oysters propagating in these waters.

A small acreage of western oysters has existed for a number of years near the head of Netarts Bay in Tillamook County. This bay is a very shallow arm of the sea with practically no fresh water entering it. Conditions here are apparently not favorable to the oysters. The high salinity of the waters of the bay and lack of organic material which fresh water streams naturally carry into the ocean, together with lack of proper care of the beds, may account for the fact that the oysters in this locality are retarded in their development and very small in size. The annual output from the Netarts Bay beds is negligible. One may occasionally find small amounts on the nearby markets of Tillamook City but the source is incapable of supplying even local demands.

About four years ago plantings of the western oyster were made on a small scale by private parties in Coos Bay. The outlook of this experiment is encouraging. A satisfactory amount of spat has been caught each season since the plantings were first made. The beds are being expanded and, with proper care and attention, there is reason to expect that this project may develop into a profitable oyster industry.

That Coos Bay once supported the western oyster in abundance is evidenced by the great quantities of shells thrown out by the steam dredge in the process of deepening the channel. The

Indians state that the oysters were destroyed during the great forest fire which swept the Oregon coast more than eighty years ago.

After careful investigation of the entire coast of Oregon it is the belief of the writer that very favorable conditions are to be found in certain regions of Coos Bay for the propagation and growth of the western oyster. The chief objection found here, as in other bays of the state, is the muddy bottom which permits no support for the oysters. In many localities it will be found necessary to prepare proper foundations of stone or shell which will serve as clutch for spat and prevent the growing oysters from becoming smothered in the sediment.

It is to be hoped that those responsible for the development of the fisheries interests of the state will give increasing attention to the possibilities of the expansion of oyster culture in Oregon.

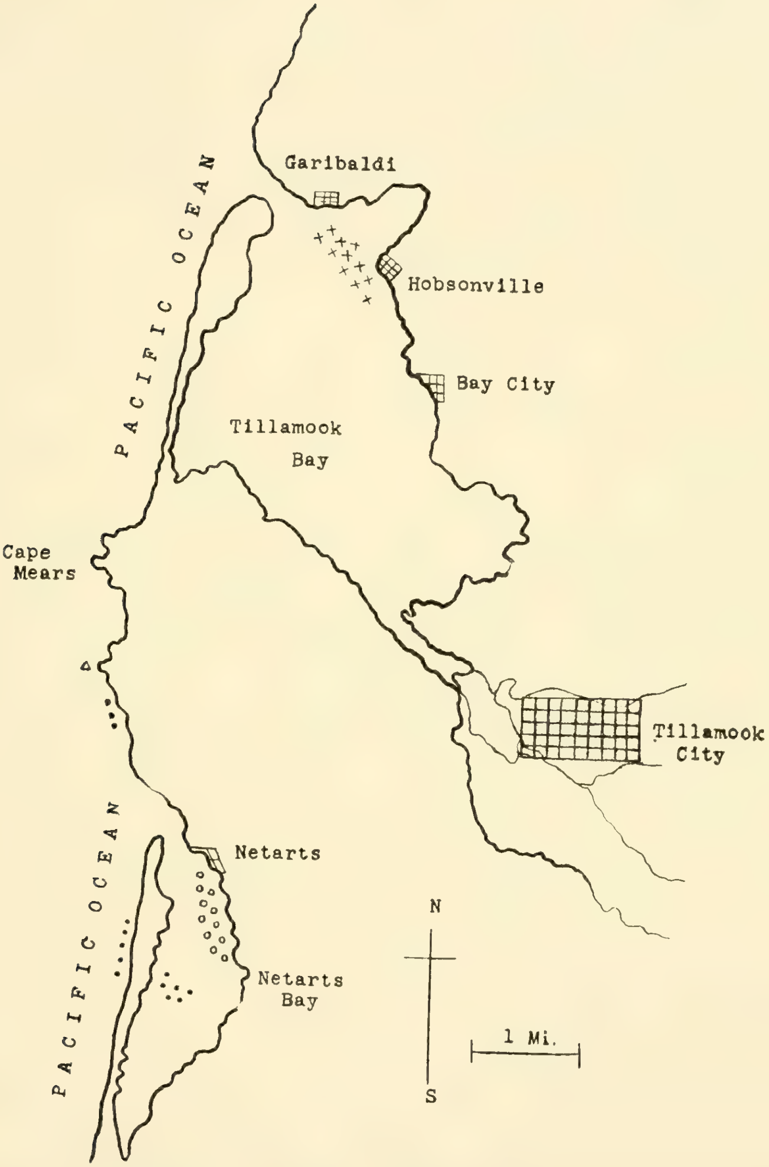

Garibaldi
Hobsonville
Bay City
PACIFIC OCEAN
Tillamook Bay
Cape Mears
Tillamook City
PACIFIC OCEAN
Netarts
Netarts Bay
N
S
1 Mi.

Figure I. Distribution of shellfish in Tillamook Bay, Netarts Bay and along adjacent shores. (X) Beds of Cardium corbis Martyn in Tillamook Bay. (O) Area abundantly supplied with Schizothaerus nuttalli Conrad, a small quantity of Saxidomus giganteus Deshayes and scattering numbers of Cardium corbis Martyn and Paphia staminea (Conrad). (●) Siliqua patula Dixon is known to occur within Netarts Bay in small numbers, and in 1919 reappeared on the ocean beaches both north and south of the mouth of the bay. (△) Large beds of Mytilus californicus Conrad cover the rocks south of Cape Mears.

Toward the south end of Netarts Bay is a small area of the western oyster, Ostrea lurida Carpenter. The production is slight.

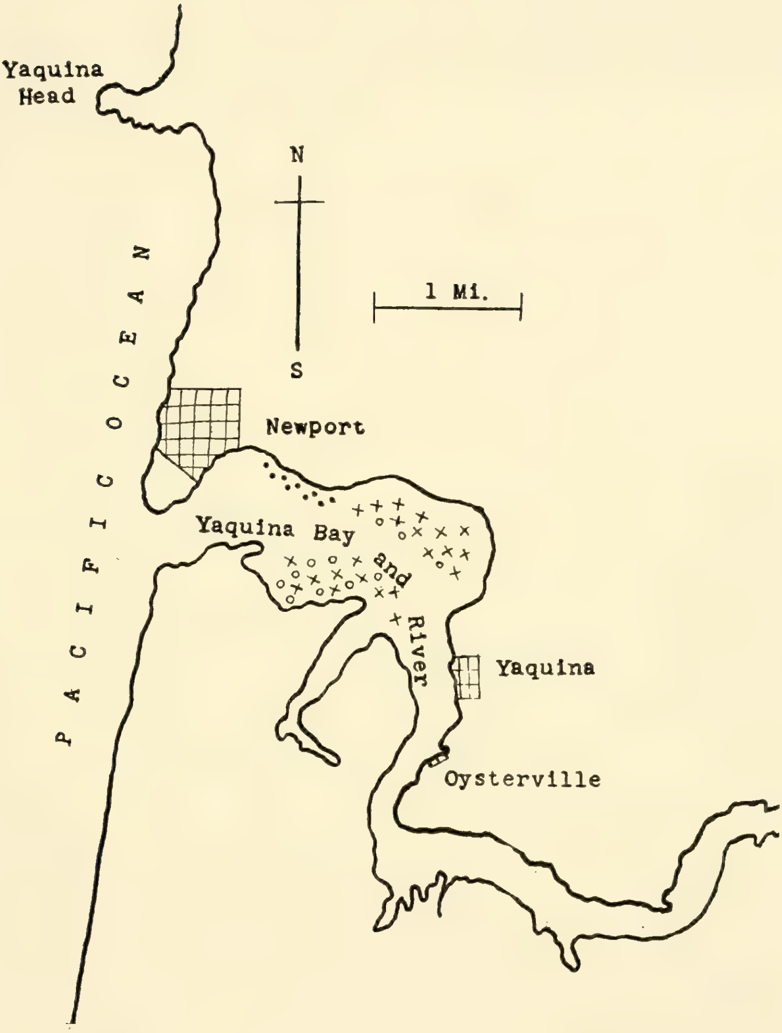

Yaquina Head
N
S
1 Mi.
PACIFIC OCEAN
Newport
Yaquina Bay and River
Yaquina
Oysterville

Figure 11. Distribution of shellfish in Yaquina Bay and River. (× ○) Beds of Schizothaerus nuttalli Conrad and Cardium corbis Martyn, the latter principally on the south side of the channel. (●) Scattering numbers of the above species together with Paphia staminea (Conrad), Macoma nasuta Conrad and Saxidomus giganteus Deshayes. The latter is rarely taken here. The beds on the north shore of the bay were largely destroyed in 1919 by dredging operations.
Mya arenaria Linnaeus occurs in the river above the town of Yaquina and beds of the western oyster, Ostrea lurida Carpenter, are located in the channel of the river near Oysterville.

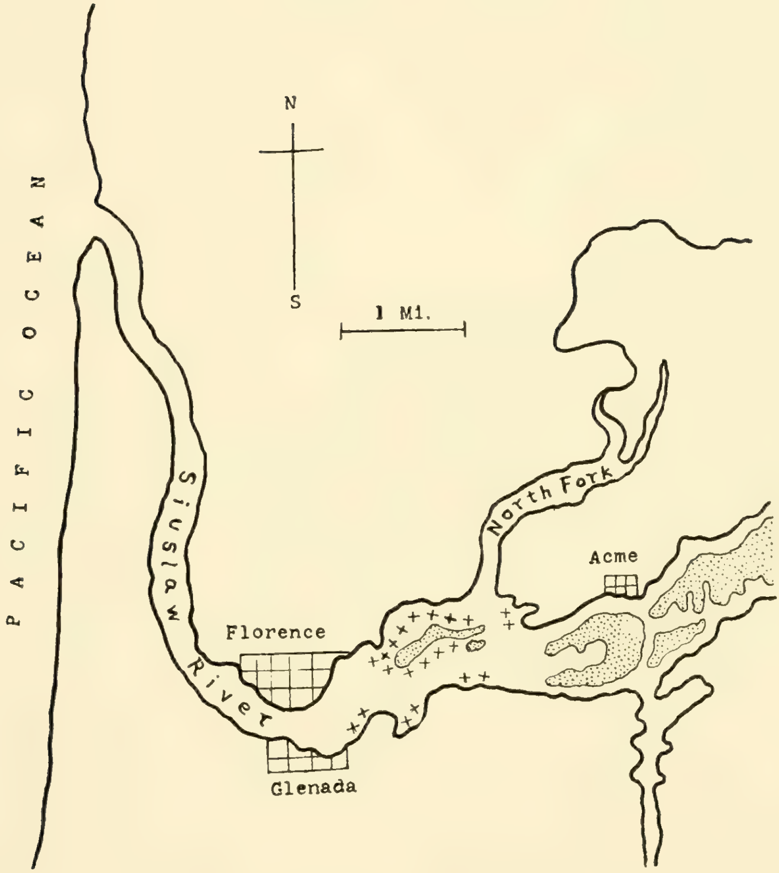

N
S
1 Mi.
PACIFIC OCEAN
Siuslaw River
North Fork
Acme
Florence
Glenada

Figure III. Distribution of Mya arenaria Linnaeus in the Siuslaw River. (×) The beds chiefly on the north side of the channel between the towns of Florence and Acme.

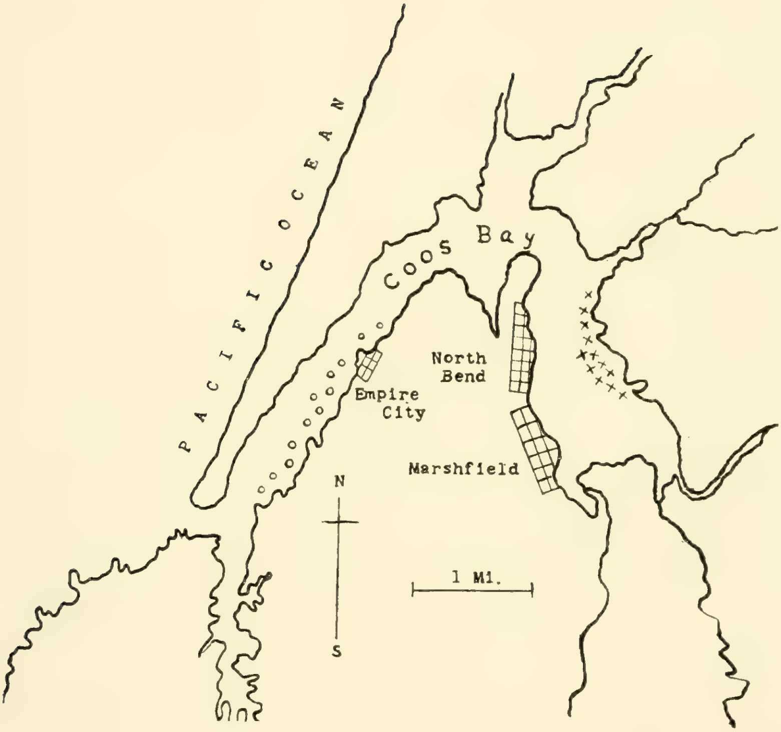
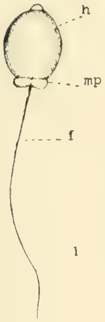

PACIFIC OCEAN
Coos Bay
North Bend
Empire City
Marshfield
N
S
1 Mi.

Figure IV. Distribution of clams in Coos Bay. (X) Principal beds of Mya arenaria Linnaeus opposite North Bend. (O) Scattered along the east shore of the bay below Empire City are considerable numbers of Paphia staminea (Conrad), Cardium corbis Martyn and Schizothaerus nuttalli Conrad.

Figure V. Explanation: 1. Siliqua patula Dixon. Mature spermatozoon, July 22nd. h, head; mp, middlepiece; f, flagellum. Length of head and middlepiece .004 mm. 2. Siliqua patula Dixon. Mature ovum, July 22nd. n, nucleus; nc, nucleolus. Diameter 0.125 mm. 3. Siliqua patula Dixon. Section of follicle of spermary, July 22nd. Greatest length 0.6 mm. 4. Schizothaerus nuttalli Conrad. Mature spermatozoon, March 30th. Letter reference as in 1. Length of head and middlepiece .005 mm. 5. Schizothaerus nuttalli Conrad. Section of follicle of spermary, March 30th. Greatest length 0.6 mm. 6. Schizothaerus nuttalli Conrad. Section of follicles of ovary almost spawned out, March 30th. 7. Paphia staminea (Conrad). Section of follicle of spermary, March 30th. Greatest length 0.5 mm. 8. Paphia staminea (Conrad). Ovum approaching maturity, March 30th. Letter reference as in 2. Diameter 0.12 mm. 9. Paphia staminea (Conrad). Mature spermatozoon, March 30th. Letter reference as in 1. Length of head and middlepiece .008 mm. 10. Mya arenaria Linnaeus. Mature spermatozoon, September 4th. Letter reference as in 1. Length of head and middlepiece .004 mm. 11. Mya arenaria Linnaeus. Developing phases of spermatocytes from a group of four cells to a small follicle of many cells. The earlier stages more highly magnified than the latter. 12. Mya arenaria Linnaeus. Mature ovum, September 4th. Letter reference as in 2. Diameter 0.12 mm. 13. Cardium corbis Martyn. Hermaphroditic condition shown. Follicles of spermary surrounded by follicles of ovary. August 29th. Greatest length of sperm follicle 0.4 mm. 14. Cardium corbis Martyn. Mature spermatozoon, August 28th. Letter reference as in 1. Length of head and middlepiece .008 mm.

Figure VI. Explanation. 1. Pholadidea penita (Conrad). Fully developed spermatozoon, March 27th. h, head; mp, middlepiece; f, flagellum. Length of head and middlepiece .005 mm. 2. Pholadidea penita (Conrad). Section of follicle of spermary, March 27th. Greatest length 0.6 mm. 3. Pholadidea penita (Conrad). Section of follicle of ovary, March 27th. Greatest length 0.5 mm. 4. Saxidomus giganteus Deshayes. Fully formed but not active spermatozoon, November 29th. Letter reference as in 1. Length of head and middlepiece .008 mm. 5. Saxidomus giganteus Deshayes . Section of follicle of spermary, November 29th. Greatest length 0.65 mm. 6. Saxidomus giganteus Deshayes. Ovum enclosed in a dense membrane and developing from the wall of a follicle, November 29th. f, follicle; m, membrane; n, nucleus; nc, nucleolus. Long diameter of ovum 0.125 mm. 7. Saxidomus giganteus Deshayes. Ovum approaching maturity, June 12th. Letter reference as in 6. Diameter of ovum 0.125 mm. 8. Macoma nasuta Conrad. Mature spermatozoon, March 31st. Letter reference as in 1. Length of head and middlepiece .006 mm. 9. Macoma nasuta Conrad. Section of follicle of ovary, March 31st. Greatest length 0.5 mm. 10. Mytilus edulis Linnaeus. Section of follicle of spermary from mantle, March 25th. Greatest length 0.4 mm. 11. Mytilus edulis Linnaeus. Fully formed spermatozoon, March 25th. Letter reference as in 1. Length of head and middlepiece .005 mm. 12. Mytilus edulis Linnaeus. Section of follicle of ovary from mantle, March 25th. Greatest length 0.4 mm.



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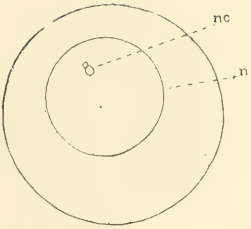

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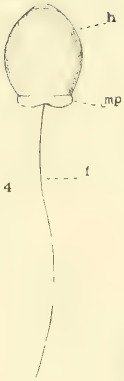

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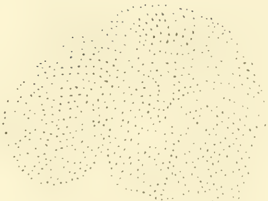

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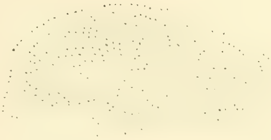

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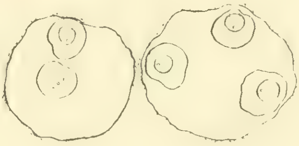

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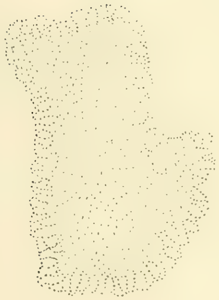

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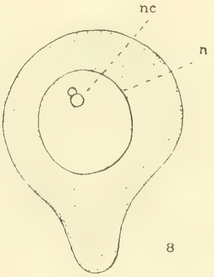

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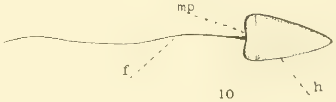

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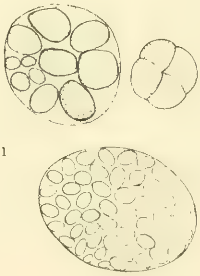

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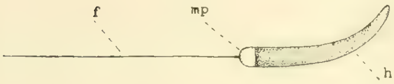

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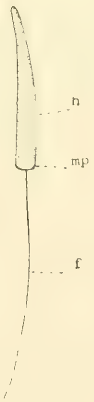

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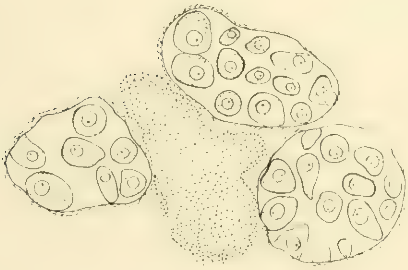

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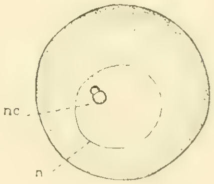
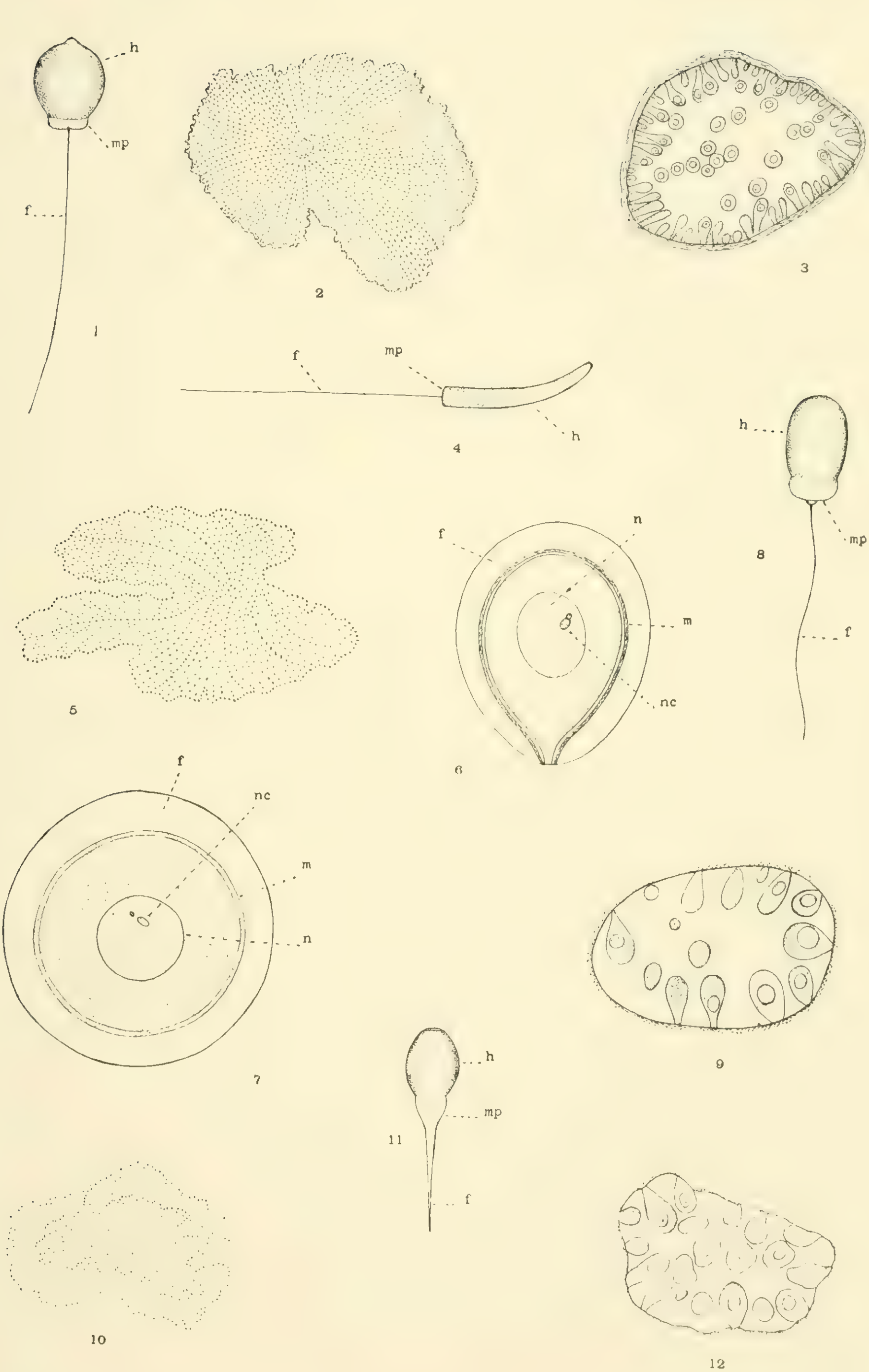


12

FIGURE V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h
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FIGURE VI.

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OCCASIONAL PAPERS

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With Plates XVII-XIX

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Fish-Poisoning in the Hawaiian Islands

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Hola, Fish-Poisoning in Hawaii.

One of the many methods of fishing practiced by Hawaiians was the *hola*, a term which signifies: (1) the material as prepared for fishing, (2) the particular system of fishing, (3) to take fish by poison. As the food of the Hawaiians consisted largely of fish, they, like other Polynesians, were expert fishermen. Not only were their fishing implements well developed, but their working knowledge of the habits of the local fishes was remarkably good. It may seem surprising, therefore, that a people so largely dependent on fish food should resort to a method which with the mature fish destroyed also the immature. But this quick and certain means of taking fish being carried on during only part of the year, the damage to the fishing industry was probably not so great as might be expected.

The natives state that the poison most frequently used for hola-fishing was obtained from two plants, *auhuhu*[1] and *akia* (see p. 226), and that they were prepared in the same way—comminuted by being pounded with stones. The resulting mass was enclosed in various kinds of packages and then quickly applied. It is the odor emanating from the freshly crushed vegetation that affects the fish, according to the native idea, and so no time was wasted. It would seem that the strength as well as the odor of the *hola* was soon dissipated and that the poison quickly lost its effect.

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[1] The toxic principle of *auhuhu*, as identified recently in a preliminary study of the plant by Mr. C. E. Warriner, chemist of the Hawaiian Sugar Planters' Association, is Glucoside. It is hoped that an exhaustive investigation of the vegetable poisons used by the Hawaiians may be undertaken in the near future.

The fishing was done in fresh-water streams, on reefs, along rocky shores, and in tidal pools. In stream fishing a dam was built across a brook—few Hawaiian streams are more than mountain brooks—and the *hola* was placed in the stream above. It is said that very large catches of gobies and shrimps were taken with dip nets in the newly formed pool. According to some accounts the mud was stirred up when the poison was placed in the stream, as the mere disturbance of the mud had the effect of dislodging the fish. The same method was used in driving fish down stream to be caught by sieve-weirs.

In sea fishing along the shores and the reefs, the *hola* was enclosed in loose packages made of grass, of *aa niu* (sheath fibre of coco palm-leaf stems), or possibly of some other porous material. In later times an ordinary sack was employed. The package was placed for a few minutes at the mouth of a hole where fish were known to be, or was passed slowly along the base of a large boulder. The fishing was always confined to a small area, for on coming in contact with the narcotic, the fish that could escape naturally darted into the open and were caught in a seine placed for the purpose. Some fishermen dispensed with the seine and took the chance of catching the fleeing fish with dip nets. Most of the fish, according to the report of the natives, were overcome so quickly by the poison that they could not escape and were taken with the hand or dip net. Occasionally the package of *hola* was attached to a stick for more convenient application.

While at Honaunau, on the Island of Hawaii, the writer had an opportunity of witnessing the process of preparing *hola* and later the use of it in a tidal pool. It came about in this way. In many places along the shore the surface of the ancient lava flow showed unmistakable marks of pounding. Markings were found in an irregular belt following the line of the sea and extending inland about a hundred feet. The natives explained that these markings were where *auhuhu,* one of the plants used for fish-poisoning, had been pounded, and that the use of the plant had continued until goats exterminated it in that vicinity. The natives then described the process in detail. As further inquiry brought out the information that *auhuhu* could be obtained in a cattle pasture at Kauleoli, two miles to the south, arrangements were made for a temporary revival of the destructive ancient practice.

Four men were despatched to gather *auhuhu,* and after an absence of three hours they returned with four bundles containing in all 128 plants. The plants were in flower and fruit and were complete, having been pulled up by the roots; they ranged in height from 1½ to 2½ feet. (See Plates XVII *A* and XIX *B.*)

At low tide, the men went to the shore, taking with them the *auhuhu,* two dip nets, a small seine, two sticks, and a sack. The sticks were not for driving out the fish from crannies—the poison did that; they were a means of defense against eels, which were greatly feared. The men had prepared themselves for sea fishing, but knowing the difficulty of photographing objects in the waves, the native foreman directed them to a pool called Kekuai'o, in which, it was said, many large fish had been taken. This pool was irregularly oval in shape, with a surface measurement of 22 by 26 feet. The depth varied from 1 to 3 feet. At low tide the waves lapped in at one corner, but at high tide they swept strongly through the pool. There were three small rocks standing up in the pool and many crevices in its sides. When first examined, it seemed without fish, except for *ohua*[2], which are to be seen in all the tidal pools. The only interference by the writer in what followed (except for the necessary pauses for photographing) was to remind the men that grass had not been brought for the packages. The men set to work on a level portion of the lava flow, 20 feet distant from the pool. The bundles were thrown down, untied, and pounded as they lay (Plate XVII *A*). The pounders were rough stones, averaging 15 pounds in weight, selected without especial care. Each man proceeded with his work according to his own idea, one of the two older men beginning at the blossom end of the bundle and the other at the roots. After ten minutes, all the leaves, seed-pods, and twigs were broken off and the bark of the stems was loosened. The bark was then rapidly and cleanly peeled from the stems and roots, and the wood was discarded

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[2] Young of the *manini (Hepatus sandvicensis),* called *ohua* until about 2½ inches in length. The Hawaiians daily catch great quantities with dip nets for food.

(Plate XVII *B*). The mass was again pounded, until it was reduced to the fineness of chaff. It was then gathered up very carefully, even to the scraping of the matted fibre from the bedrock, the whole process of pounding taking twenty minutes. The resulting *hola* was a dark rich green in color, and was slightly moist to the touch.

The *hola* and grass were carried quickly to the edge of the pool. The grass was taken up in small bunches, which were bent and twisted roughly into "spoons", and a double handful of *hola* was placed in the bowl of each (Plate XVIII *A*). The employment of the grass was to avoid the bites of eels. As rapidly as possible the filled spoons were thrust under the rocks and into the holes in the sides of the pool, and were then withdrawn, leaving the *hola* behind (Plate XVIII *B*). The spoons were quickly refilled and re-emptied, but they held together for only about three dips, after which the men used their bare hands—apparently there was insufficient time to make new spoons. Throughout, the actions of the men were very quick, as rapid as the needs of photographing would permit; they seemed anxious to get the *hola* into the water in the freshest condition possible. The stain from the *hola* had the strong green tint of stagnant salt water. It spread gradually through the pool, beginning to show within half a minute. Before the *hola* was all placed in the water (the operation taking about five minutes) some fish were seen making their way to the entrance of the pool, which was thereupon blocked by dropping the seine on it in a heap.

Within ten minutes after the first immersion of the poison, the fish (except the eels) were swimming about aimlessly, or floating either on or below the surface of the water. Many were taken with the hand, but most of them with the dip nets. In fifteen minutes all the fish in sight had been gathered except the eels, which were resistant to the full effects of the poison.[3] Some of the latter began to wriggle out of the pool. It was surprising to note that the small *ohua* seemed to be affected much more slowly than the other and larger fishes. Another point of interest was the quantity and diversity of the fishes which soon appeared in the pool from the various crevices. The specimens were all small, the longest eel measuring 20 inches, and the longest of the other fishes 6 inches. Observations on the drugging were greatly hindered by the unexpected interest of the spectators, mostly women and children from Honaunau village. These Hawaiians, instinctive fishers, naturally became much excited when the fish began to swim around in a dazed and "catchable" condition. Women and children piled into the pool, clothes and all, in a desire to help, and caught fish right and left with the greatest glee. The light was too dull to photograph except with time exposure, or the very animated scene might have been visually recorded.

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[3] A similar condition was noted on Ponape. Christian, F. W., The Caroline Islands, p. 126, London, 1899.

An incident that occurred during the *hola* fishing at Honanau illustrates a marked Hawaiian characteristic—the desire to please. After the first excitement had calmed down, and the fish had been sorted, named, and counted, the men were posed for their photograph with their somewhat insignificant catch (Plate XIX *A*). Just before the plate was exposed, the man on the left seized his stick, and jumping behind the rock where his father was standing, began to poke vigorously in the water. He was ordered back, as it was supposed he was merely chasing another fish. During a second pose he repeated the performance, and was called back with a severe reprimand. No explanation was given. On the third attempt to photograph the movement began again, and then an eel came flying through the air, kicked out of the water by the vigorous old man. This eel, the cause of the disturbance, was one of the kind called *puhi wela-wela* (=hot) because its bite causes a "hot wound"—and the patient fellows were doing their best to be accommodating while the half-drugged eel was swimming around their bare feet!

One and a half hours after the proceedings described, the pool was again visited. Fresh sea water had meanwhile entered and made a clear border two feet wide along one side of the pool. It contrasted very strongly with the green tint of the poisoned water. In the clear water there were a number of active *ohua*—apparently recent arrivals from the ocean. Half as many more fish as previously taken were seen lying dead on the bottom, including some eels. Other eels, however, were still struggling in the drugged water or had moved on to the dry rocks. One of these placed for ten minutes in clear water to see if it would revive gave no sign of life.

Most of the dead fish were *ohua,* from one to two inches long. It is possible that they were overlooked previously on account of the excitement and the stained, but not turbid water. It is more probable, however, that they survived longer through greater power of resistance to the drug, as in the beginning their slowness to succumb had been noticeable. A holothurian in the pool and mollusks clinging to the sides did not appear to be affected, but it was difficult to make sure of their condition.

A list of the fishes caught is given herewith under their local names on the Island of Hawaii. There were 126 specimens identified, with the aid of the United States Fish Commissioner's Report for 1903, as 17 species.

List of fishes taken at Honaunau.

	Number first lot	Number second lot
Aeaea	5	....
Aholehole, Kuhlia malo	18	....
Alaihi, Holocentrus sp.	25	1
Aloiloi	2	....
Kikakapu, Chaetodon sp.	5	....
Kupipi, Abudefduf sordidus	3	....
Mamo	2	....
Manini, Hepatus sandvicensis	10	2
Ohua " "		20
Nunu, Aulostomus valentini	1	1
Palemo	3	2
Pauu, Myripristis chryseres	....	1
Puawowo	1	....
Puhi wela (eel)	3	10
Puhi uha kalakoa (eel)	1	3
Puhi paka (eel)	....	1
Upapalu, Amia menesema	5	....
Uu	1	....
	85	41

All the fish, except the eels, were taken home for food by the natives. The men said that they did not treat such fish differently in any way from those caught by other means, and that they were personally in no degree affected by the *hola,* neither during the pounding nor after eating the fish. Most, if not all, of the kinds of fish taken are customarily eaten raw without preparation. Some of the Oahu natives say that *hola* gives a bitter taste to fish entrails, which on this account are removed before the meal. In discussing the effect of fish poisons the natives have always appeared to think that what would kill fish would also kill human beings if taken internally, and yet they did not hesitate to eat the poisoned fish. It is true that there is a case on record of a woman having been killed by an infusion of *auhuhu, akia,* and leaves of *ipu awaawa* administered in *awa* which she drank.[4] The native account is that she drank the *awa* and detecting an unusual bitterness declared that she had been poisoned. The story goes that she died shortly afterwards. As the Polynesians, however, were subject to self-hypnosis, it is possible that the woman died of fright. *Awa* itself is bitter, and one Hawaiian herbalist gave the information that *auhuhu* and *akia* were administered as human poison in *awa,* as the *awa* disguised the odor of the other ingredients.

The writer tested the effect of *auhuhu* on himself by chewing twigs, leaves, and seeds, but no uncomfortable effects were observed except a slight parching of the throat for the rest of the day.

In regard to the effect of *auhuhu* on animals, inquiries of ranchmen on Hawaii brought out the opinion that it is harmless to horses and cattle, although one ranchman said that some of his stock had been poisoned by eating the weed. The goat drivers when questioned said that neither goats nor cattle were affected by the poison in the plant. It would seem therefore that *auhuhu,* at least, has little or no harmful effect on the systems of warm-blooded animals, but the question is still a mooted one.

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[4] Wilkes, U. S. Exploring Expedition, vol. 4, pp. 30, 31, Philadelphia, 1844.

PLANTS USED IN HOLA FISHING.

The plants used by Hawaiians in hola-fishing were *auhuhu* (*Tephrosia piscatoria* Pers. = *T. purpurea* Pers.) and *akia* (*Wikstroemia* sp.), the former being the more highly prized. Indeed most of the better informed Hawaiians say that these were the only sources of fish poison. One reliable informant, however, added the bitter gourd *ipu awaawa* (*Cucurbita maxima* Duch.) to the list and explained that *akia* was not a very strong poison. *Akia* alone was sufficiently powerful to kill small fish, but to kill large ones the leaves or fruit pulp of the *ipu awaawa* were combined with it.

Hillebrand[5] mentioned *awa* (*Piper methysticum* Forst.) as a fish poison, but no confirmation of such use is obtainable from natives today. They say that *awa was* used by fishermen, but ridicule the idea of wasting it on fish. It is possible that Hillebrand had in mind the traditional custom of "feeding" *awa* to sharks in the process of "creating" shark gods. Rock[6] adds the *anapanapa* or *kukuku* (*Colubrina asiatica*) to the list, with the statement that it "was often used for stupefying fish." He was, however, unable to recall his authority but thought it was a man from Kauai. The writer has consulted old Hawaiians from Oahu, Maui, and Hawaii on the subject, and they deny that this shrub was used for narcotizing fish. We may admit the possibility that the plant was used for such a purpose on the Island of Kauai. The introduced *Plumeria* was mentioned by one Hawaiian as being used as a fish-poison, and there are probably many other plants suitable for the purpose. Quicklime is said to have been used in later times, occasionally, with *auhuhu* and *akia*.

Auhuhu is a small shrub, 1 to 3½ feet high, growing in the open on the rocky ground of the coastal region and of the valley slopes. Its best development is reached in the dry sections below the 300-foot level, and it has not been observed at a greater elevation than 1000 feet above the sea. Its stock is perennial, foliating thickly, fruiting after heavy rains, and dying back in dry weather.

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[5] Hillebrand, W. F., Flora of the Hawaiian Islands, p. 384, Heidelberg, 1888.

[6] Rock, J. F., Indigenous Trees of the Hawaiian Islands, p. 283, Honolulu, 1913.

It was gathered for *hola* during the growing period, as the natives assert that it was without bitterness in its dormant state. This bitterness they associate with the poison. Plate XIX *B* illustrates a flowering and fruiting specimen from Oahu, about 2½ feet high, found growing in a soil pocket on a limestone slope and crowded by exotic vegetation.

In many localities *auhuhu* has been exterminated. Among the contributory factors are the competition of introduced plants, the native method of gathering, and the ravages of goats and cattle.

Heller, writing in 1897[7], reported *auhuhu* growing plentifully on the western slope of Diamond Head, Oahu. but in 1920, at the right season, the writer searched for it unsuccessfully. A native of Oahu claimed to have gathered the plant in Heller's locality in 1912, further asserting that this spot was noted for efficacious *auhuhu*. As for some years past, there have been dairy yards on the western side of the crater, and cattle trails high up on the slope were observed during the search mentioned, the disappearance of the plant in that locality was undoubtedly due to cattle. In 1919 while on the Island of Hawaii, the writer learned the goats had exterminated the *auhuhu* in a pasture of 6 to 8 square miles. The native goat drivers (who were also fishermen) reported that the goats ate the entire plant and that cattle ate the plant when in the dormant, but not in the growing state—without, however, destroying the root. Perhaps its greatest rival is the allied indigo[8] *(Indigofera anil L.*, introduced in 1836), which has found easy entrance on account of the fisherman's method of pulling up the *auhuhu* by the roots.

To present-day Hawaiians *akia* as a fish poison is less known than *auhuhu,* though as a medicine it is still in use. The older Hawaiians speak of two kinds, *akia manalo*, or *akia maoli*, which is not bitter, and *akia awaawa,* the bitter form. The bitter variety is said to have been used for fish poison.

Hillebrand described seven species and four varieties of *Wikstroemia (akia)* in the Hawaiian Islands, varying in size from small shrubs to small trees, and ranging from near sea level to an elevation of 7000 feet, but generally found growing in the lower forests. As the native vegetation is receding all these species become more and more difficult to find.

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[7] Heller, A. A., Plants of the Hawaiian Islands: Minnesota Geol. and Nat. Hist. Survey Bull. 9 (Minnesota Bot. Studies, vol. 1), p. 833, 1894-1898.

[8] Hillebrand. Op. cit.

The same author has the following note on the genus[9]: "Like many other plants of this order, the Hawaiian Akeas [*akia*] contain an acrid narcotic principle, and are employed by the natives in common with Awa and Ahuhu [*auhuhu*] for narcotizing fish." He attaches the Hawaiian name *akia* to *Wikstroemia foetida,* var. *oahuensis,* which appears to have been the form most widely spread through these islands.

The writer has found it impossible to secure from the natives an identification of the particular form of *akia* used for fishing. Two specimens of the plant were collected on Oahu in 1920 by Mr. C. N. Forbes—mountain forms of *W. foetida* and *W. elongata.* The first specimen was shown to three natives, one of whom identified it as *akia maoli,* the medicinal form. He did not know of *akia* having been used for fishing. The second native identified it as *ahihi,* a form of *Metrosideros,* and the third as *koko,* a medicinal plant. Two of the men said they were acquainted with *akia* fishing.

Afterwards another native was engaged to collect the *akia awaawa* on Oahu. He returned confidently with a specimen of *W. foetida,* of a slightly different form from that previously collected by Mr. Forbes. All the specimens, including that of *W. elongata* were then submitted to a native from the southern part of Kona in the Island of Hawaii. He said they were not *akia awaawa.*

The specimens were then shown to the occupants of the Lunalilo Home for Aged Hawaiians. Some recognized the first specimen of *W. foetida* as the real *akia awaawa* and rejected the second specimen. A rather forceful old man said that none of the specimens was the right one; that the *akia awaawa* was a shrub about 2½ feet high with small leaves, almost round, and could be found growing at a certain place on the north side of Oahu.

The native from South Kona offered to send home for a specimen of the desired plant, but when it came, it was without blossoms. Mr. Forbes, however, recognized it as a long-leafed form of *W. sandwicensis.* On a subsequent visit to the district of Puna, on the southeast coast of the Island of Hawaii, the writer made further inquiries concerning the *akia awaawa,* was shown a shrub, and obtained a specimen which Mr. Forbes identified as coming from a short-leafed form of *W. sandwicensis.*

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[9] Op cit.

While Hillebrand lists seven species and four varieties of *Wikstroemia* from these islands, the appearance of different specimens of the same species varies so greatly that the uninitiated might well suppose that the number of species was much greater. The blossoms are very small. From a consideration of the native accounts so far collected, it is evident that the term *akia awaawa* may be applied to many species of *Wikstroemia,* dependent on the uses to which local Hawaiians put them.

Referring to *akia,* Andrews[10] notes: "The bark is used to poison fish in fresh water as *auhuhu* is in salt." Some of the older natives say that *akia* and *auhuhu* were used alike in fresh or salt water, but that *auhuhu* was much the stronger. An experiment tried in fresh water on imported small rainbow fish gave the following results:— *Auhuhu* killed the fish in from 11 to 17 minutes, *W. foetida* in 38 minutes, and *W. elongata* in 19 minutes. The idea probably intended to be conveyed by Andrews was that *akia,* being generally found in the mountains, usually served for stream poisoning, while *auhuhu* growing near the shore was used in the sea. It is doubtful if *akia* would be used were *auhuhu* available or in season. In these experiments, after the first fish died the others were placed in clean well-aerated water, but none of the fish recovered.

The practice of *hola* has been almost, if not entirely abandoned in the Hawaiian Islands, owing in part to a lessening of the available poison plants, but in a large degree, probably, to the adoption of the equally reprehensible and even more destructive method of fishing with dynamite.

FISH-POISONING IN SAMOA.

For the following account of fish narcotization in Samoa the writer is indebted to Mr. E. J. Mooklar, a chemist who resided in

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[10] Andrews, Lorrin, Hawaiian Dictionary, Honolulu, 1865.

Tutuila from 1901 to 1912 and frequently witnessed the process there. Mr. Mooklar's description is more detailed than that of most writers on the subject of fish-poisoning in Southern Polynesia.

The narcotic that Mr. Mooklar saw in use was extracted from the unripe or green seed kernels of the *futu (Barringtonia speciosa)*. This tree is to be found growing luxuriantly along the sandy beaches of all the islands of Samoa, frequently with its roots in the salt water and its branches overhanging the sea. The buoyant seeds drop into the water in great quantities and, while some are carried away by wind and ocean currents. large numbers are washed back again to the beach where they sprout readily. The seeds are somewhat pyramidal in form, the husk corklike and fibrous. Those used for fishing are gathered from the trees. Though Seemann states that the husk was used, in the process seen by Mr. Mooklar (and other writers confirm Mr. Mooklar's account) only the kernel[11] was taken, being either pounded in stone mortars or grated to a coarse meal. The grater was a piece of tin plate roughly punctured by nails, then bent into semi-cylindrical form and fastened to a flat board.

The fishing was done in pools left by the receding tide. Very soon after grating the prepared meal the fishermen threw it into the water by handfuls, where it sank slowly. The effect of the poison was quick, as in a few minutes the fish were observed floating helplessly on their sides on the surface of the pool. They were taken as rapidly as possible, as the natives believed that the fish would recover if permitted to float into untreated water. It was also stated that human beings were in no way affected by eating the narcotized fish. While the process observed is modern it is probably similar to the older method, with the addition of the tin grater.

Though Mr. Mooklar did not know of the use of any other fish-poisons, several writers have spoken of other plants used for the purpose. Other fish-poisons reported as used in Samoa are *Tephrosia piscatoria,* which according to Brown[12] was mixed with taro when applied, and an unidentified beach vine mentioned by Mrs. Churchill[13], whose account is detailed and interesting. Her description of the plant suggests *Ipomea pes-caprae* or *I. terebrethum,* but the bitter taste described is lacking in the Hawaiian *Ipomea.* It is possible that the plant was *Derris uliginosa* Benth, which Seemann[14] reports as used for poisoning fish in Fiji, and which approximately agrees with Mrs. Churchill's description. The well-known writers on Samoa—Stair[15] and Turner[16]—do not mention fishing by poison.

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[11] Seemann, Berthold, Flora Vitiensis, p. 82, London, 1865-1873.

[12] Brown, Macmillan, Melanesians and Polynesians, p. 337, London, 1910.

The fish poison most used in Polynesia in ancient times was from *Barringtonia speciosa,* which was plentiful in the South, but did not grow in the Hawaiian Islands. According to Williams[17] it was used by the Polynesians from Tahiti to Tonga, and other writers report its use in Fiji[18], Guam[19], and the Solomon Islands[20]. When in abundance its preparation was probably quicker than the poisons used by the Hawaiians, a fact which may explain the southern preference for the *Barringtonia.* *Tephrosia piscatoria* is reported by Gray[21] as occurring also in the Society group, Samoa, Tonga, and Fiji, and it was used in the Society Islands[22] and Samoa[23]. *Wikstroemia foetida* was also found in the Society and Marquesas groups, Samoa, and Fiji[24], and was used in the Society group mixed with *Barringtonia*[25] seeds. Seemann notes that neither this plant nor *Tephrosia piscatoria* were observed as fish poisons in Fiji.

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[13] Churchill, Mrs. Llewella, Samoa 'Uma, p. 122, London and New York, n. d.

[14] Seeman, Berthold, Viti, p. 339, Cambridge, 1862.

[15] Stair, J. B., Old Samoa, London, 1897.

[16] Turner, George, Samoa a hundred years ago, London, 1884; Nineteen years in Polynesia, London, 1861.

[17] Williams, John, Missionary enterprises, p. 501, London, 1838. See also Ellis, William, Polynesian researches, vol. 1, p. 140, London, 1853; Christian, F. W., Eastern Pacific lands, p. 65, London, 1910.

[18] Seeman, Berthold, Viti, p. 339, Cambridge, 1862.

[19] Safford, W. E., Useful plants of Guam: Contr. U. S. Nat. Herb., vol. 9, pp. 81-82.

[20] Guppy, H. B., The Solomon Islands, p. 158, London, 1887.

[21] Gray, Asa., U. S. Exploring Expedition, vol. 15, Botany, p. 407, Philadelphia, 1854.

[22] Ellis. Op. cit.

[23] Brown. Op. cit.

[24] Gray. Op. cit.

[25] Seemann, Berthold, Flora Vitiensis, p. 207 (quoting Solander).

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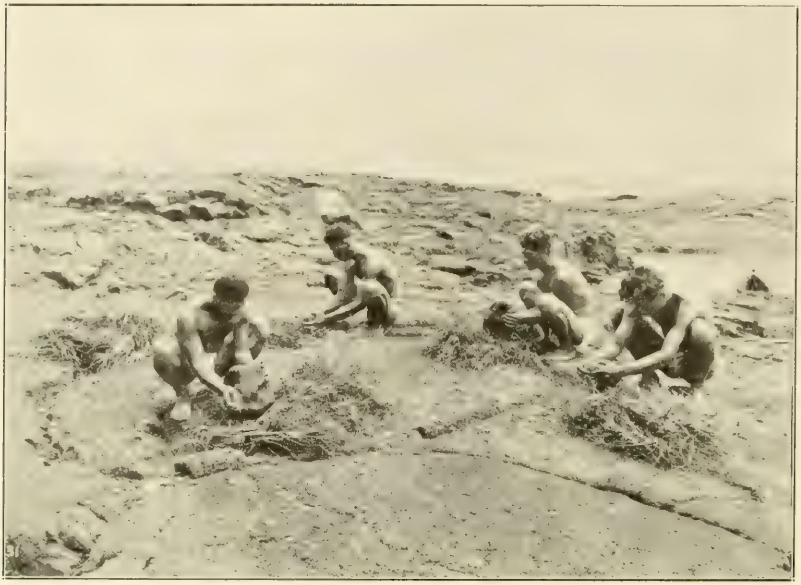
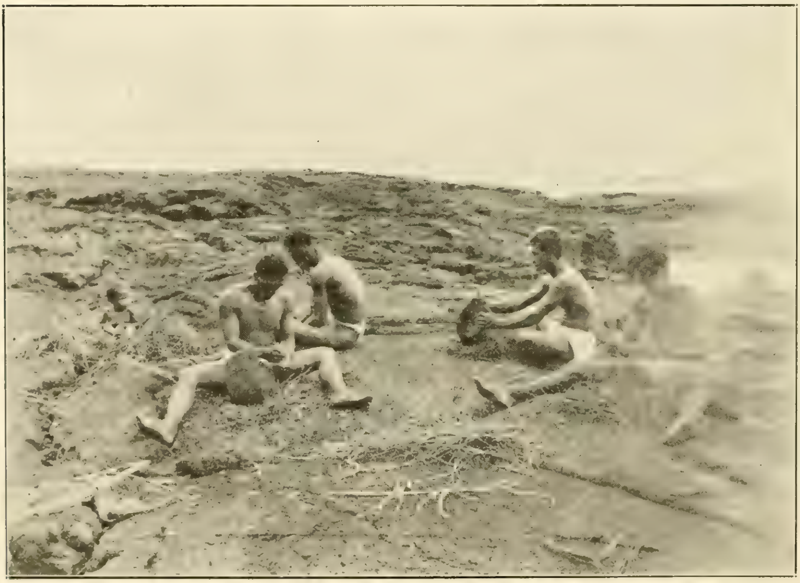
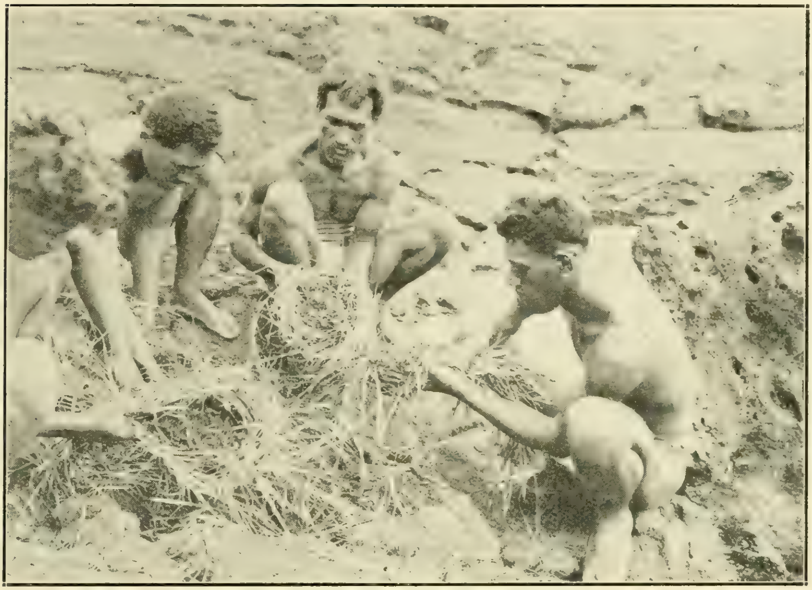


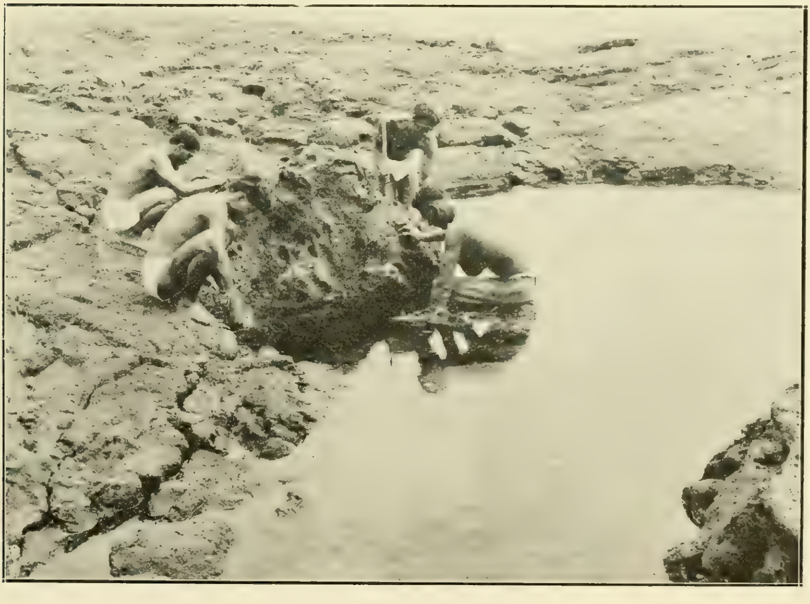
A, MAKING HOLA: (1) FIRST POUNDING.



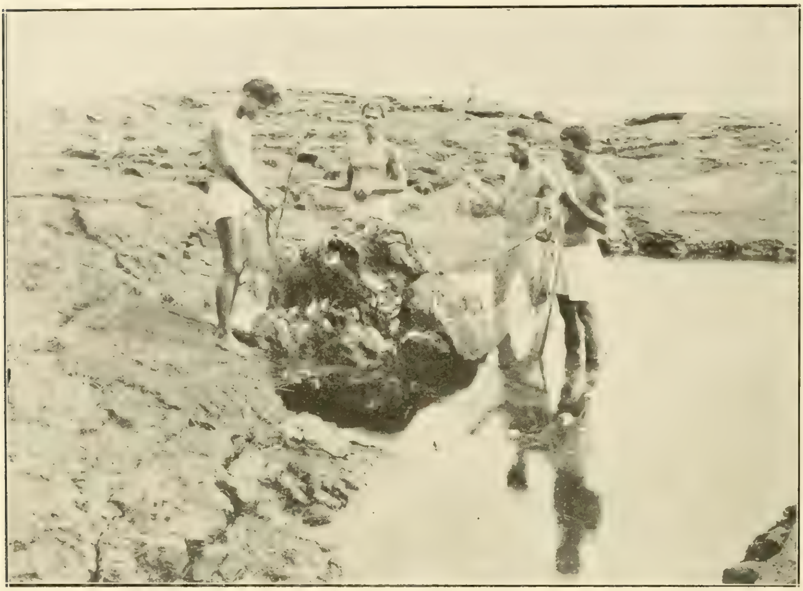
B, MAKING HOLA: (2) TWO OUTER MEN STRIPPING BARK; (3) MAN ON INNER RIGHT AT THE FINAL POUNDING.
(By request, the wood was thrown into the foreground.)



A, HOLA IN GRASS "SPOONS."



B, APPLYING HOLA.



A. THE CATCH.

B. AUHUHU. TEPHROSIA PISCATORIA PERS.
(A small space was cleared around the shrub before photographing)

14.223

OCCASIONAL PAPERS

OF THE

BERNICE PAUAHI BISHOP MUSEUM OF POLYNESIAN ETHNOLOGY AND NATURAL HISTORY

Vol. VII—No. 11.

With Plates XX—XXIII.

AN ARCHAEOLOGICAL SURVEY OF HALEAKALA

BY

Kenneth P. Emory

HONOLULU, HAWAII
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An Archaeological Survey of Haleakala

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INTRODUCTION

Haleakala, which is substantially coextensive with east Maui, is the giant volcanic cone of the largest inactive crater in the world. It rises from the sea to a height of 10,000 feet, culminating in a jagged wall 20 miles in circumference which forms the encircling rim of the crater broken only at Koolau Gap and Kaupo Gap. The floor of this crater, an area of about 15 square miles, lies 1000 to 3000 feet below the rim and forms a base from which rise a series of ancient cinder cones overspread by lava flows of various ages.

This enormous pit with its meager plant and animal life and its uncongenial climate seems a most unsuitable place for even temporary settlement. "Tradition throws no light upon any occupancy of the Crater of Haleakala,[1] and few travelers across these desolate wastes have had occasion to wander far from well established trails. It is not therefore surprising that the existence of ruins within Haleakala has but recently come to the attention of ethnologists.

Early in 1920 the Museum received from C. S. Judd, Territorial Forester, a photograph of a walled enclosure on the floor of the crater, and later in the year information from Miss Armine Von Tempsky, transmitted to the Museum by Mr. L. A. Thurston, led to the organization of a field party to investigate reported discoveries. Leaving Honolulu on August 27, Robert T. Aitken and the writer spent seventeen days at Haleakala on a preliminary reconnaissance survey that furnished sufficient data for Mr. Aitken to submit a report recommending further investigation. On October 2, with Antone Gouveia as assistant, the writer returned to

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[1] Personal communication, March 23, 1921.

Maui to complete the survey which is the basis of the present report.

The Museum is under special obligation to members of the Von Tempsky family, who have thoroughly explored the crater on their many hunting and camping trips. Their guidance and assistance are largely responsible for the results obtained. Acknowledgment is also made to Mr. H. A. Baldwin, who generously supplied horses and pack mules, and to Mr. W. A. Clark, manager of Grove Ranch, who assisted in many ways. Thanks are due also to Mr. Aitken for the use of parts of his preliminary report which at various points supplement the observations of the writer.

STONE STRUCTURES IN HALEAKALA

PUU NAUE GROUP

Exactly in the center of the Crater a symmetrical gray cinder cone, Puu Naue, rises to a height of 250 feet above the level floor. Its crater dotted inside and out with the beautiful silversword plant and stunted pilo bushes, is 198 feet in depth and 750 feet in diameter. At the bottom are three terraced platforms (Pl. XX, *A*). The one on the north slope is in ruins as a large boulder, rolling down from above, has destroyed a good part of the back and front retaining walls. Its horizontal dimensions[2] are 26 feet on the north, 24 feet on the south, 11½ feet on the east, and 10½ feet on the west. The back wall rests on the slope of the cinders. The height of the front wall, though 34 inches at the southeast corner, averages not more than 32 inches. The east wall is not only higher and more solidly built than the others but is twice as wide and presents a table-like top. The structure has the appearance of a stone inclosure, but the whole platform was probably once filled with sand and gravel, so that its surface was level with the lower part of the surrounding wall, as were the other two platforms, which are in a good state of preservation.

Although this structure is in ruins there is nothing to indicate that it is older than the east and south platforms. Possibly the reason for building it farther up on the slopes was that the

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[2] Measurements are estimated to the nearest half foot; to be more precise would give a wrong impression, as the construction of the walls was always rough and irregular.

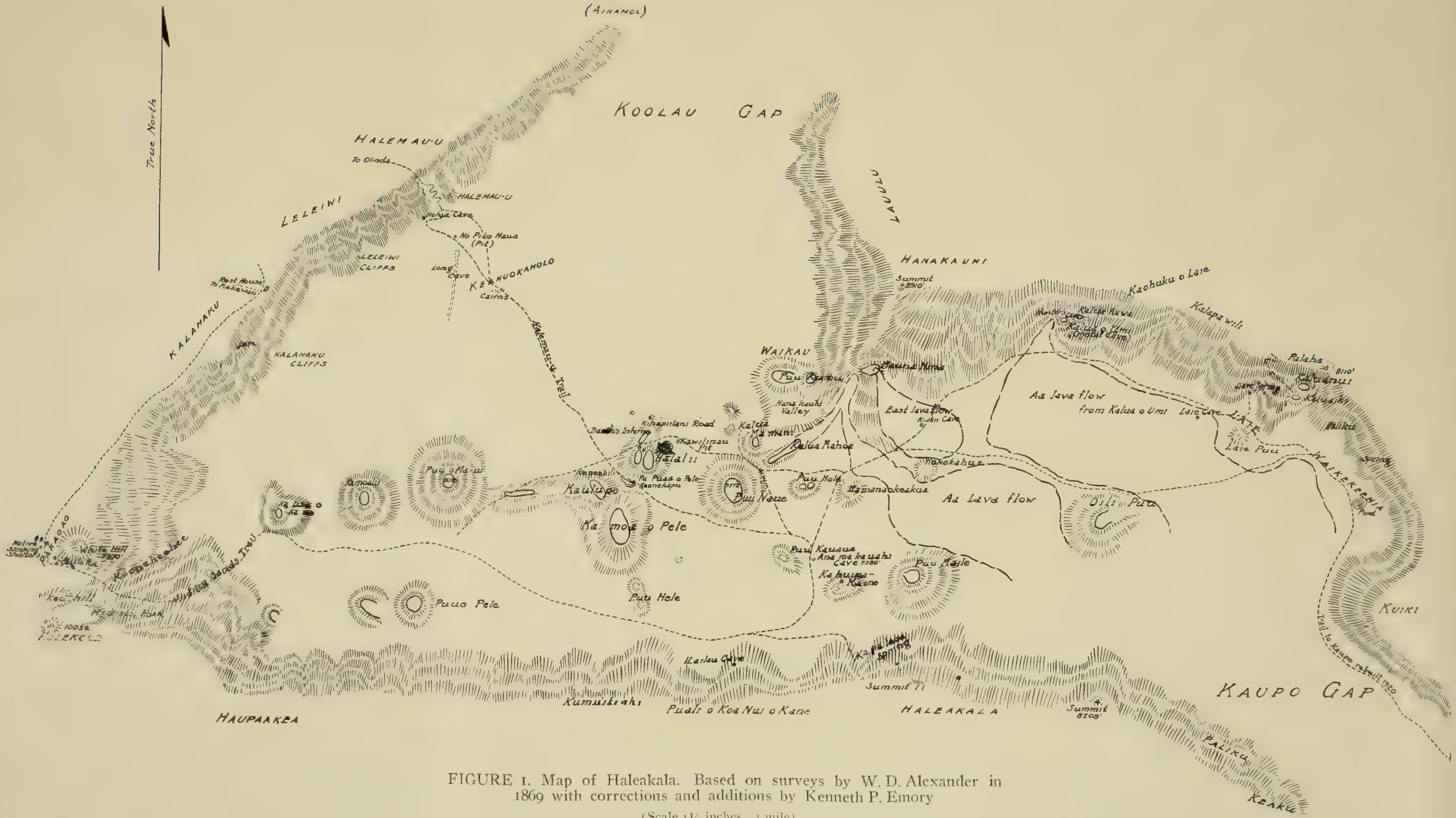
True North
(AINAHOU)
KOOLAU GAP
HALEMAU-U
To Olinda
HALEMAU-U
Holua Cave
No Piko Haua (Pit)
LELEIWI
LELEIWI CLIFFS
Long Cave
KEAHUOKAHOLO
Cairns
Rest House
To Makawao
KALAHAKU
KALAHAKU CLIFFS
Halemau-u Trail
LAUULU
HANAKAUHI
Summit 8910'
Kaohuku o Laie
Kalapawili
WAIKAU
Puu Kumu
Hana kauhi Valley
East lava flow
Kuiku Cave
Aa lava flow from Kaluu o Umi
Laie Cave
LAIE
Laie Puu
Palaha
8110'
Kaumanui
Kaluakii
Spring
Pond
WAIKEKEHIA
Kihapiilani Road
Dante's Inferno
Kawilinau Pit
Halali'i
Kalua Mahoe
Kalua
Puu Nole
Kamanaokeakua
Aa lava flow
Oili Puu
Puu Naue
Pa Puaa o Pele
Keonehapu
Kaupo
Kapaphili
Puu o Maui
Kamoaali
Ka moa o Pele
White Hill
Sliding Sands Trail
Kea hill
10032
Puuo Pele
Puu Hele
Puu Kauaua
Ana ma kauahi Cave 7380'
Kahuna Kane
Puu Naile
KUIKI
Trail to Kaupo rebuilt 1920
KAUPO GAP
Ilarlau Cave
Summit
Summit 8208'
HAUPAAKEA
Kumuiliahi
Puali o Koa Nui o Kane
HALEAKALA
PALIKU
KEAKU

FIGURE 1. Map of Haleakala. Based on surveys by W. D. Alexander in 1869 with corrections and additions by Kenneth P. Emory

(Scale 1¼ inches = 1 mile)

large stones near the bottom of the crater had already been utilized in the construction of the other two platforms.

The slightly larger south platform (Pl. XX, *B*) is rectangular, measuring about 26 by 16 feet. Its height along the north front is 2 feet, but the back is merely indicated by a single course of stones. Across the platform is laid a row of small stones making the northern end a nearly square enclosure. Our excavation of this structure proved that the walls had not been trenched or buried by sliding or drifting sands. The upper division had been excavated to a depth of 2 feet by Mr. Aitken. We excavated a pit 4 feet deep below the apparently undisturbed strata of cinders in the lower division and sunk a trench along the front outside wall, but discovered no shells, artifacts, nor skeletal material.

The excavation of the east platform to a depth of 5 to 7 feet below its surface and then under the walls gave us likewise nothing. This platform is 12 feet along the bulging north side, 12 feet on the south, 15½ feet along the east, and 11 feet on the west. The highest part of the surrounding wall is on the west side, where it is 32 inches high.

On a knoll at the southern foot of Naue Cone is a small platform. Its top is not flat like the others but curved up very noticeably toward the south. This platform is 20 inches high, 4 feet wide and 11 feet long, extending east and west and is built solid of local stone on lava bedrock. We discovered this fact by taking down the structure, restoring it again immediately as we were always careful to do. Near this platform we picked up four water-worn pebbles the size of a large egg.

BURIAL AHU IN KAMOA O PELE

Ten minutes' walk across the sands southwest of Puu Naue brings one to the low break in the wall of Kamoa o Pele, a cinder cone, colored an even, soft red. On the floor of its crater is an ahu.[3] (Pl. XXI, *A*.)

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[3] *Ahu* as the term is used in this paper is a cairn built for some purpose by Hawaiians. In Polynesia the word *ahu* signifies heap, or pile, and was often used to designate a stone memorial pile.

We took down the stones of this ahu in such a manner as to be able to restore them. To our surprise, we found the base approximately a rectangle, 6½ feet on the north and south, 5 feet on the east, and 5½ feet on the west. It rests on a flat surface produced by digging into the side of the crater. Excavation for a depth of about two feet under the south end of the ahu brought into relief the remains of a body placed face downward, lying southeast and northwest, the head under the south edge of the ahu (fig. 2). The body had been buried grasshopper fashion, the hands were on the back and the legs, bent at the knee, lay alongside the ribs. Two sticks of mamani wood, three inches in diameter and longer than the remains, were above, one on either side of the skeleton. They suggested a stretcher by which the body had been borne to this isolated grave. Near the hand were a few pieces of decayed calabash. The skull and jawbone were in good condition, the teeth almost perfect, and all present except the right canine and the premolar, which had been lost during life. The bones of the lower part of the body were much less well preserved.

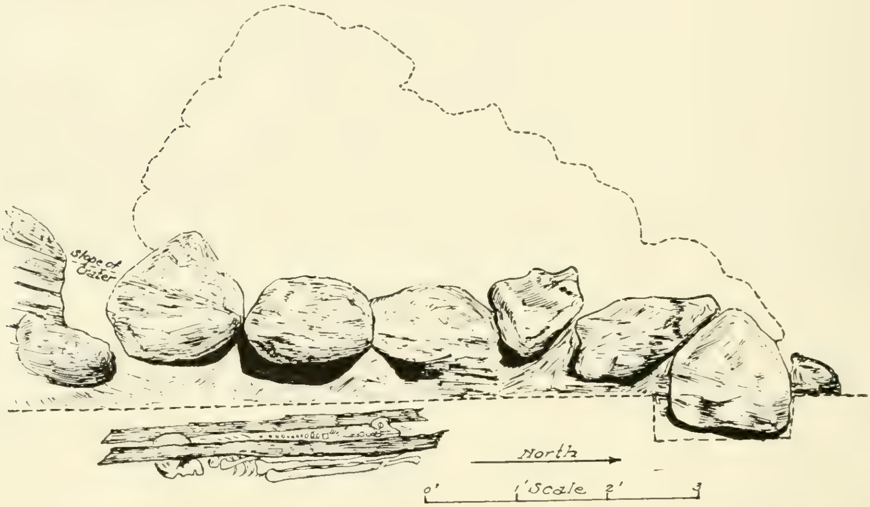


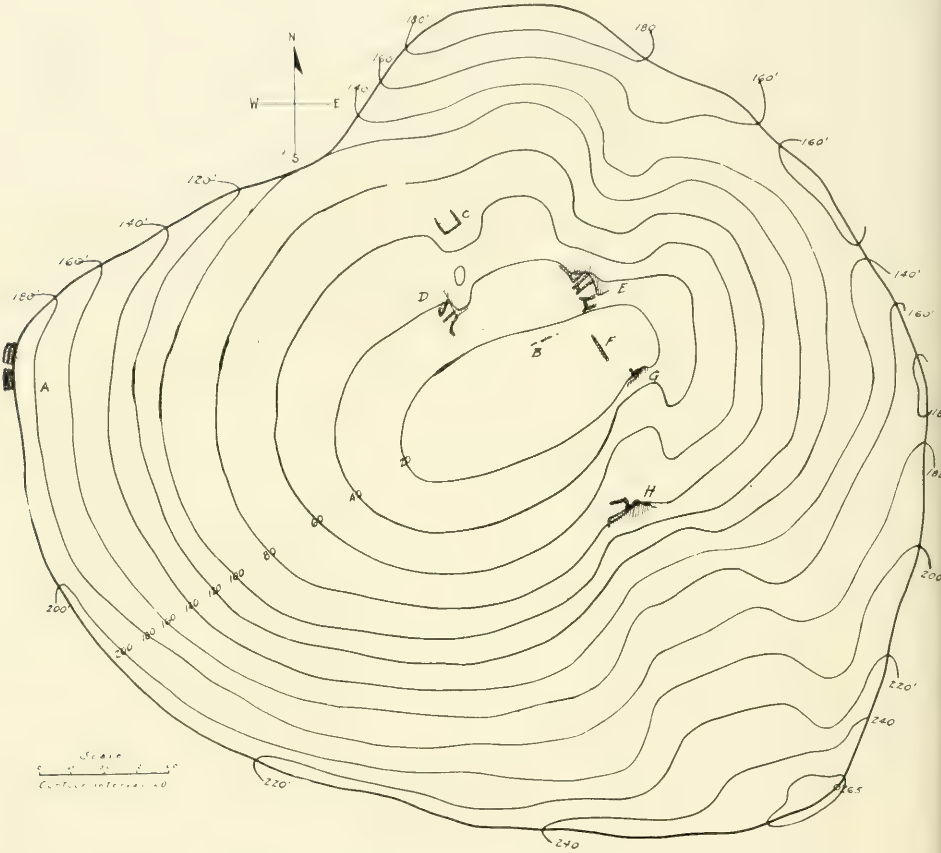
FIGURE 2. Sketch of the ahu in the Crater of Kamoa o Pele showing manner of burial.

One leg bone had been broken by the pressure of the overlaying stones. An examination by L. R. Sullivan showed that the remains were probably those of a female adult about 4 feet 11 inches in height and 35 years of age; the skull was of the Hawaiian type with some Melanesian characteristics. The teeth were slightly decayed and showed advanced pyorrhea in the molar region. An interesting feature of these remains is an area about the size of a silver dollar on the top of the skull, which represents a concussion from a blow that was evidently the cause of death. There seems to have been some knitting of the fractured bone, indicating that death was not instantaneous.

It took four of us with good shovels 50 minutes to assemble the ahu. Two men with calabashes might have dug the pit, laid the sticks and body, filled the pit, gathered the stones and built up the structure in four hours, but probably a much longer time was taken.

HALALII GROUP

Adjoining Kamoa o Pele is the black cone of Halalii which includes two craters separated by a wall a hundred feet high. They must have been the seat of the most violent gaseous activity; the cinders and rocks, particularly of the smaller crater, are brightly colored, every hue from orange to purple. On exploration of the smaller crater on the northwest no trace of ancient structures was found. The larger crater differs from the craters of the other cones examined in that its slopes are broken by outcropping dikes of igneous rock. Some portions of the dikes overhang slightly, and in the shelter thus afforded a series of terraces have been constructed. (See map, fig. 3.) The crater is most easily accessible from the northeast, but the approach from the spatter cone, Pa Puaa o Pele, between Kamoa o Pele and Halalii leads to the ruins of a treble terrace (fig. 3, *A*) which lies on the west rim. This terrace is 36 feet long with a break of three feet in the middle. The top step is 1 foot high along the front and is level with the outside of the crater rim. The two lower steps are 26 inches wide and 1½ and 2 feet high, respectively. It is perhaps significant that from this terrace one may observe all other structures within the crater.


N
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20
A
B
C
D
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F
G
H
Scale
Contour interval 20

FIGURE 3. Map of the Crater of Halalii from a plane table survey by Kenneth P. Emory. A, B, C, D, E, F, G, and H mark the site of ruined stone structures.

At the foot of the northern slope we traced a two-foot wall (fig. 3, *B*) over which a slide has passed. The wall appears to be the front of a terrace or of several small terraces. The structure on the northwest side of the crater (Pl. XXII, *A*, and fig. 3, *C*), is a terraced platform 13 by 16 feet, resting on an exceedingly steep slope, and supported by a dike of igneous rock. When first visited only the west wall was in position. On our second visit time was taken to build the walls to their original height and to fill the enclosure with gravel. Excavation sunk to bed rock revealed no human remains, or implements.

Below the platform under the dike is a series of three terraces (Pl. XXII, *A*, and fig. 3, *D*). The bottom terrace, nearly buried by rocks from above, supports a second terrace 3½ feet high, 12 feet long, 5½ feet wide, which in turn supports the top. 1 foot 8 inches high and 14 feet long. With pick and shovel we laid bare the front wall of the terrace which had been 1½ feet underground and 1 foot above. It ran along for 9½ feet, then took a right-angle turn and extended out for 5½ feet. We removed the sand inside the wall down to 3 feet without finding anything of interest. We next dug along the face of the dike which forms the north side of the other two terraces of the series, and extended from this trench into the terraces themselves. On a level with the surface of the top terrace, 5 feet back from the front wall and 5½ feet from the cliff we found a tooth that had belonged to an adult, and then a skull face up. Near at hand were fragments of other bones. There was a stone to the east of the skull and a small stone resting on top of it. On the same contour as the terraces just described and under the north dike is an interesting series of five terraces (Pl. XXII, *B*, and fig. 3, *E*) which measure as follows:

Terrace	Length of front wall	Height	Width of terrace
	Feet	Feet	Feet
Lowest	12	2	5
Second	9½	1½	5
Middle	15	4	7
Fourth	18	6	3
Top	11	2	7⅓

Each terrace supports the one above it. The fourth is the largest of the series, and on it has been built the top terrace.

We recovered the bones of an adult female and a child of four years of age within the space of the top terrace but also deep enough to have been in the fourth terrace. The skull of the woman was missing, but the jawbone in good preservation lay right side up 17 inches below the surface and 36 from the front wall of the fourth terrace. No teeth were found. Some of the molars had evidently been lost in life. Ribs and isolated vertebrae extended the width of the grave to the cliff where we found the entire skeleton of the child buried 32 inches deep, turned slightly to its left side, the head towards the northeast. A toe bone was found 5 feet away, buried 1 foot under the east end of the platform, and some of the smaller bones were only 1 foot under the surface and next to the front wall. There was very coarse gravel about the bones and large stones on all sides of them. In examining the bones from this terrace, Mr. Sullivan found an extra femur of a child about three years of age. It is difficult to account for the absence of the long bones of the adult, which were searched for most thoroughly. Either they had been removed before the rest of the skeleton was deposited, or the grave had been opened and the missing parts removed. I think the latter explanation the more plausible, for none of the bones were broken and some of the rib bones and vertebrae were in their appropriate position. To explain the single femur of the child is likewise difficult.

While filling in the top terrace we started the sand sliding from above, and brought to view several small bleached fragments of bone and a very large, badly weathered jawbone with the teeth remaining in it. Bones of the same skeleton were found by digging along the edge of the dike and a pelvic bone was recovered from a crevice in the cliff a foot and a half under the sand. By the side of it were fragments of decayed wood, probably mamani, and bits of a calabash or gourd. The bones were those of a man about sixty years of age and well above the average height. Only a few teeth were left on the lower jaw; the skull and long bones were missing.

From an opening made in the front wall of the fourth terrace next to the cliff, we dug back 8 feet. About 3 feet behind the base of the wall one of the men picked up a perforated dog's tooth, not very well preserved. Against the cliff were a few pieces of a broken gourd and a few white bird feathers not more than an inch long.

Digging in the middle terrace revealed nothing but that the construction was identical with the other Halalii terraces; the walls were of rough, porous pieces of red, yellow, gray, and black lava 6 to 18 inches in long diameter and 3 to 12 inches in short diameter. The stones were from the immediate vicinity and assorted by sizes. The walls were laid with admirable care. In many places they bulged or curved inward a little, but were invariably perpendicular. To build a wall of a single thickness of stone, loose sand and gravel must have been raked in for support as the building was going on. The second structure appeared to be only a supporting terrace. Excavation showed that the lowest terrace was filled in with sand to about 2 feet from the surface, followed by stones about 6 inches in diameter, which in turn were covered with sand.

The north dike which borders the series of five terraces has a break near the end, one side of which appears to have once been walled up and filled with sand. Dr. George Aiken of Wailuku, Maui, reports that in this cavity he discovered ashes and a few bones which were not human.

The front wall of the little terrace under the northeast dike (fig. 3, *B*) is 4 feet long, 2 feet wide, and stands out from the cliff 5 feet. The wall has a wing on each side extending out 2 feet which has held back the gravel from sliding onto the space before the terrace. Against the cliff wall, 34 inches beneath the surface of the terrace, a rib bone was found. After some difficult excavation in sliding gravels, we found a skull, face down, slightly turned to the south, and below this a smaller skull filled with broken bones, and then a third very small skull and jaw. Scattered bones were also found. The largest skull was that of a man about sixty years of age who had lost during life most of his molar and premolar teeth. The other skulls were those of a child of four and a child of three years of age. All were of a pure Hawaiian type.

On the southeast slope stands a single terrace (Pl. XXI, *B*, and fig. 3, *H*) examined by Mr. Aitken. Its situation is such that only a front retaining wall 14 feet long and 3 feet 2 inches high is necessary to make a platform 14 to 18 feet long and about 9 feet wide. The wall is very well laid and is nicely adjusted to the curve of the natural ledge. The stones in the upper courses are the size of a man's head and those in the lower courses twice that size. At the northeast edge of the terrace a crevice in the rock was followed for about eight feet but without finding evidence of use, and a trench on the platform 6 feet deep and 6 feet long revealed nothing.

Excavation on the structure at the place marked on the map (fig. 3, *F*) disclosed a terrace with a front wall 25 feet long and 5 feet 2 inches high at the middle. Position of the back boundary was not determined but it was at least 10 feet from the retaining wall. We trenched for about six feet in from the center and about six feet deep. The large stones prevented further work. A space for about 25 feet in front of the structure seems to have been formerly cleared of stone and may have had some connection with the use of the terrace. Two smooth beach pebbles found at Halalii are considered by Mr. Aitken to be sling stones.

PA PUAA O PELE GROUP

Fifteen yards east of Pa Puaa o Pele is a stone structure 9 feet long and 5 feet wide. The Kaupo natives point this out as the grave of two men and a woman who scratched the sacred sands and were lost in the descending fog and perished. This legend did not seem plausible since the structure closely resembles the platform at the base of Naue and those on the lava flows. Excavating cleared our doubts, for it revealed no burial in or under the structure. It is quite likely that natives perished here but the story of their burial is probably an attempt to explain the existence of the structure. A slingstone was lodged in the corner of the structure and five others were scattered about it. There are about 50 ahus around Pa Puaa o Pele; none half as large as the burial ahu in Kamoa o Pele and some consisting of only three stones one on top of the other.

On the slopes of Kaulupo is an ahu or a platform 7 feet square and 4 feet high. Near it are 15 very small piles of stones each about a foot high.

HANAKAUHI GROUP

Three platforms and two ahus in Hanakauhi Valley, a little pocket lying between Mamani and Kumu Hills, were examined by Mr. Aitken from whose report the descriptions are taken. The three platforms, which are situated respectively in the south, east, and north parts of the valley, are notable for the volcanic bombs used in construction. The isolated south platform is bordered by a wall less than 2 feet high, which forms a rectangle 15 by 7 feet. The space within the walls is filled with sand and gravel forming a surface which corresponds with the slope of the ground.

The poorly preserved east platform with dimensions about 12 by 4 feet is similarly constructed. The north platform (Pl. XXIII, *A*) differs from the other two in the presence of a secondary wall about 5 feet from the outer south wall, which divides the platform into two longitudinal sections. Due west of the north platform is an anomalous structure consisting of two walls forming a right angle that corresponds in position with the southwest corner of the platform. Near the entrance to Hanakuhi Valley are two solidly built ahus constructed of unmarked local stones. The north ahu measures 5 by 7 feet and the south ahu 5½ by 9 feet; both are 2½ feet high and lie east and west. By standing on them the three platforms in the valley can be seen and the approach to the valley watched.

We removed all the rocks of the south ahu and dug under it, discovering nothing. Excavation of north platform (Pl. XXIII, *A*) resulted only in a knowledge of its construction. A wall extending north and south for 19 feet along the Puu Kumu slope of the valley had been built up 2 feet. Then the side towards the slope had been filled in with two layers of stone, half as large as those in the walls, and then coated over with several layers of sand. This made a terrace 5 feet wide, closed at either end by a solidly built wall. At the back of this terrace was laid a single course of volcanic bombs, averaging a foot and a half in diameter, and 3 feet back from this line was laid another row of bombs. The shallow space between was filled level with sand 3 inches deep on the up valley side, and 12 inches deep on the down side. The terraced platform rests on hard-packed cinders in which bombs and pieces of lava are embedded. The south platform rests on a flat solid lava floor and is similarly constructed.

MAMANI GROUP

A group of eleven platforms that presented some types new to us were discovered at the foot of Mamani Hill (Kalua Mamani). A small terraced platform rests on the west slope of Mamani where it joins the floor of the Crater. It measures 12½ by 4½ feet, lies northeast and southwest, and is 1½ feet high along the front. It is very similar to the lower terraces of the north and south Hanakauhi platforms. and its dimensions are the same as the east platform.

Two hundred feet southwest from this platform is an unusual square structure, raised on a knoll. It is 4½ feet on the north, 6 feet on the south, 4½ feet on the east, and 6 feet on the west. It is 1½ feet high except on the east and south sides which are a foot higher, forming a shelf 2 feet wide.

One hundred and fifty feet west of this is an unimposing structure of slabs from an aa lava flow, laid one upon the other to a height of 1½ feet in the form of a rectangle 3½ feet by 7. This and the structures described below lay on the sands at the edge of an old lava flow issuing from Dante's Inferno. They are oriented parallel to it—that is, northeast and southwest—and extended in a line towards the northeast.

The next structure, one hundred feet away, differs markedly from the others in having a T shape. The stem of the T is 3 feet square and on the east joins, about in the middle, the platform, which is 15 feet long by 5 feet wide and 2 feet high. A platform 130 feet farther on is 19½ feet long, 3½ feet wide, and 2 feet high.

Ninety feet beyond this are two structures a few feet apart. They are almost square, measuring 4 by 6 feet, and not more than 2 feet high. Several yards away from these is a platform 13 feet long, 3 feet wide, and 1½ feet high, which rests upon a solid lava flow. Ten yards from this platform is a miniature one, 2 by 3 feet, and 1 foot high.

Two hundred feet south on a part of the same flow is an area 6 feet square and less than a foot high, paved with stones. We removed the stones to make sure that they concealed no crack or opening in the lava. One hundred feet east on the very edge of the flow is the last of the structures, a platform measuring 3 by 5 feet and 3 feet high.

KIHAPIILANI ROAD

The upper part of the lava flow from Dante's Inferno is traversed by an ancient Hawaiian road. We were able to trace its course over the lava, but lost it where it crossed the sands. It is 6 to 8 feet wide and paved with blocks of lava. I learned from Mr. Poouahi at Kaupo that this road was built by a Makawao chief, Kihapiilani, the brother-in-law of Umi, and is supposed to have gone around the base of Mamani Hill, through the Hanakauhi Valley, above Mauna Hina cone, and along the Kalapawili Ridge to the pond Wai Ale on the outside slope of Haleakala, where Kihapiilani is said to have built a dam to hold the waters of the pool. Waterworn pebbles found above Mauna Hina and along Kalapawili Ridge might be considered as evidence. I could obtain no information about the extension of this road west across the floor of the Crater. A natural course would be along the present Halemauu Trail. There is a story current on Maui that Kamehameha built a road across the lava out through Koolau Gap. We could discover no evidence of another road anywhere in the gap.

On the south slope of the hill below Puu Mamani we found two walls, 12 feet and 9 feet long, each consisting of a single course of stones. I believe they were once the front walls of two terraces.

DANTE'S INFERNO GROUP

West from Dante's Inferno and about 200 yards beyond the place where the Kihapiilani Road is lost in the sands are three platforms. The east platform is 14 feet by 3½ feet, and 1½ feet high; the west platform is 10 feet by 5 feet, and 2 feet high. They are 36 feet apart with their long diameters extending northwest, so nearly buried in drifting sand as to appear like natural formations. About 75 feet northwest from the east platform is the remaining platform of the group, 3½ feet by 8 feet, and 1 foot high, oriented like the other two.

KEAHUOKAHOLO GROUP

From Puu Maui, the highest cone in the Crater, a ridge of red sand extends through the middle of Koolau Gap and is crossed by Halemauu trail at Keahuokaholo. Near this point and alongside of the trail is a curved stone wall 34 feet long, 4½ feet wide and 3½ feet high. Sand has nearly covered the middle. One hundred and fifty feet southeast of the wall is an ahu 3 by 4 feet.

On mounting the ridge of Keahuokaholo a surprising number of piles of stone come into view; some having thick bases, others having one stone as a base. We counted between 40 and 50 within a radius of 100 yards. East of the entrance of the trail from the Halalii side are 28 stone shelters. Among these we collected about 15 water-worn pebbles. Five had been laid together next to a ruined shelter and 3 at another shelter. There were about as many ahus and shelters north of the entrance as south of it. The structure farthest away on the north is a platform 9 feet by 3½ feet, and 1½ feet high.

On the west border of Keahuokaholo are about 50 small ahus. A ruined platform lies 100 feet south and another, measuring 3½ feet by 12 feet, is 300 feet to the northeast on the edge of a ravine, and 200 feet farther northeast is a large flat rock, three feet high, covered by a single layer of rough stones.

A few minutes walk from Keahuokaholo on the Leleiwi trail brought us to a platform 3½ feet wide and 12 feet long built of thin slabs of aa lava. About ten minutes later we reached the lava tube known as Long Cave, near which are three large stone sleeping shelters. With Dr. George Aiken as guide, Mr. Walter Walker and myself followed the cave for three-quarters of a mile without reaching its end.

A short distance north of the trail from Long Cave is the pit, Na Piko Haua, 10 feet deep and 15 feet in diameter, in which we found tucked away in crevices the umbilical cords of Kaupo babies. Some of the cords were in colored cloth wrapped with the hair of the child's mother, and others were preserved in small glass bottles; the presence of the recently hidden cords testifies to the strength of superstition among present-day natives. I have heard two explanations of this custom. Mr. Poouahi, from Kaupo, whose own cord is hidden here, claims that placing the cord out of danger of destruction protects the child from becoming a thief. It is difficult to see the connection as rats visit the caves; and besides, better protection could be obtained by hiding the cords in bottles and nearer the villages. The other explanation is from Dr. George Aiken, who at one time saw an old native throw a collection of navel strings into the Bottomless Pit, Kawilinau, exclaiming, "To make the child strong". There must be more significance to the custom. Probably these spots are sacred. The custom prevails also in the region of Mount Waialeale, Kauai.

THE OO GROUP

The uppermost cone on the Sliding Sands Trail contains a small but exceedingly steep crater filled with the debris of great rocks. Viewed from the trail no structures are visible but on the bottom of the crater are the three largest terraces that have so far been discovered. The smallest one, which banks the west slope, is 20½ feet long at the front, 22 feet at the back, 13½ feet wide, and 4 feet 10 inches high. A terrace, 13 feet long, 7 feet wide, and 1 foot high, leads up to it. The next terrace in size is on the north slope and measures 22½ feet long, 15 feet wide, 3 feet 8 inches high. By far the largest is on the southeast slope. It is 38 feet long, 22 feet wide, 6 feet high at its highest part. At the northeast corner is a depressed floor, 15 feet long, 10 feet wide, 3 feet deep. This last structure is very much in ruins.

KEONEHEEHEE TRAIL GROUP

The original form of the east terraced platform of the Keoneheehee group, north of Puu o Pele and on the south side of the trail, is recognizable. It resembles those in Hanakauhi Valley. It extends east and west 13 feet, is 4 feet wide at the east, 5 feet 9 inches at the west end, and 13 inches high. The other structure seems to have retained only two corners, 22 feet apart; it may not be a platform at all.

On the Sliding Sands we picked up half of a water-worn stone, originally the size of an ostrich egg. On the Leleiwi Trail we found another stone this size, and many pebbles.

Up among the cliffs of Kalahaku are caves. In the largest one near the Crater rim, Mr. Walker found last September the bottom part of a gourd which had been used to carry poi. While Dr. George Aiken was with us he found a water-gourd in excellent condition lying on the east slope of the Puu o Maui.

WAI KAPALAOA SHELTERS

At the foot of Puu Maile and opposite the spring, Kapalaoa, I counted over 50 stone shelters in clusters of 3 to 10, and found pebbles lying on the sand about Kahuinaokeone, but none among the Kapalaoa shelters. I do not think the shelters can be considered fortifications; they are not in strategic positions, and are too low for a man to hide behind and to defend himself while throwing sling-stones. As sleeping shelters they would serve tolerably well in clear weather, and isolated ones on the floor of the Crater have been so used even recently. The group of shelters at Kapalaoa and at Keahuokaholo are large enough to serve as sleeping quarters for 150 to 200 men.

HUNTER'S CAVE TERRACES

Until a few years ago Hunter's Cave, under the east rim of the small crater Kalua o Aawa half way up the north wall of the Crater of Haleakala, had been frequently used by sportsmen as a sleeping place. Dr. George Aiken states that there are three terraces in the back of the cave similar in construction to the terraces in Halalii. We were anxious to excavate the terraces in Hunter's Cave but its entrance is sealed by tons of rock which fell from an overhanging ledge about 1918.

LAIE GROUP

On the margin of the Kalua o Umi lava flow, between Laie Cave and the upper trail to Laie, are four platforms having their long dimension east and west. They are about 50 feet apart, each 3 feet high and the other dimensions in feet as follows: the first, 3 x 6; the second, 4 x 6; the third 3 x 6; the fourth, 3 x 5.

HALEAKALA GROUP

Haleakala proper consists of two peaks and a high connecting ridge, on the south rim of the Crater. On Summit Number 1 of Haleakala we found by far the largest stone structure in the Crater region. It has the appearance of a heiau with a base 57 feet by 36 feet, extending lengthwise along the ridge. The supporting wall on the east is 18 feet high, on the west 12 feet, on the north 6 feet, and on the south 15 feet. The top is 24 by 15 feet, roughly, and consists of two level spaces. the one on the east is 6 feet square and is sunk about 2 feet, the other is 6½ feet square and half a foot higher. A wall several feet thick separates these two level places; and in front of the eastern one extends a platform 15 feet long and 6 wide, almost overhanging the rim of the Crater. Two survey cairns have been erected on the edifice. Otherwise it is well preserved. On and near this structure ten pebbles were found.

Just east of Summit Number 1, in a dip of the ridge, is a large, rectangular stone shelter, 27½ feet long, 8 feet wide on the east, 3 feet wide on the west, with walls averaging 2 feet high, measured on the inside. There are two fireplaces 9 feet apart and 2 feet square. The eastern one contains 1 inch of solid earth covering 7 inches of white ash; in the other was found two inches of soil covering small pieces of burnt wood. Below the large shelter are four or five smaller shelters in ruins.

Half an hour's walk farther along the crest of the ridge brought us to another rectangular shelter, 6½ feet wide and 13½ feet long, with walls 3 feet high. Among the scattered rocks of the enclosure, a fireplace, 3 feet square, was found against the south wall. Other smaller shelters lie on the near-by slope. Fifty yards east in the lowest part of the ridge between the summits of Haleakala Mountain we discovered a platform with a flat stone-paved top, 4½ by 8 feet, and 34 inches high, extending east and west. A few small shelters in ruins lie 50 yards beyond, one a small wall a foot high around the mouth of a cave.

A platform crowns Summit Number 2 and near at hand are six small shelters in ruins. The platform was 20 feet long, 3 or 4 feet wide, with the wall towards the Crater 3 feet high. A survey cairn has been erected on its east end. Along the ridge we found five more pebbles and two small pieces of horned coral.

OTHER STRUCTURES ON THE RIM

In exploring the north rim of the Crater from Hanakauhi summit to Palaha, we found two platforms. One is merely a pavement of large smooth rocks meauring 6 feet by 18 feet overlooking Kalua o Umi. The other platform on the summit of Hanakauhi, is completely in ruins. Our attention was first directed to this platform by the following remark made in the Coast and Geodetic Survey records of the station. For Hanakauhi: "Station Mark: a pillar of stone 10 feet high *on an ancient platform,* maliciously demolished in 1884." On the west slope of Red Hill is a group of 25 shelters, and between Red Hill and Kolekole Hill another group of 8 or 9 with a great many small ahus. The craters of three large cones in the desolate Haupaakea section of the rim are barren of structures.

The summit of White Hill is completely covered with large, strongly constructed shelters. Just west of the summit cairn a crevice in a small cliff is sealed by stones and cement. On the ground ten feet away is a table composed of four large, flat stones one on top of the other with cement between. These are the work of W. D. Alexander during his survey of Haleakala and, together with the large stone corral near by, should not be confused with the Hawaiian structures in the crater.

Dr. George Aiken and Mr. W. J. D. Walker of Hamakuapoko, Maui, report a platform on the rim of the Crater just north of White Hill.

Hawaiian Names of Places Within the Crater

On the published maps of Haleakala the names of some of the principal cinder cones, peaks, and important localities are lacking or misplaced, and some are different from the names used by the natives familiar with the region. To remedy this defect we procured the services of a Hawaiian, Leonard Poouahi, an intelligent man forty-six years of age, who lives at Kaupo. In company with this reliable guide and his son, Joseph, the entire extent of the crater was visited and as exact information as possible obtained regarding the pronunciation, spelling, and the meaning of geographical terms. The result is shown in the following list to which definitions have been added by Thomas G. Thrum, as indicated.

CRATERS AND CINDER HILLS

Halalii (Ha-la-li'-i). Contracted form of hala alii.

Honokahua (Ho-no-ka-hu'-a). Joined foundation (Thrum).

Kahuina o ke One (Ka-hui'-na o ke O'-ne). Place where the sands meet.

Kalua o ka Oo. The pit of Oo (Thrum). (Kalua o ka Aawa of Hawaiian Government Survey map).

Kalua o Umi. Umi's pit (Thrum). On Hawaiian Government Survey map name incorrectly assigned to the cone, Halalii.

Kalua Mahoe (Ma'-hoe). The twin pit.

Kamoalii (Ka-moa-li'-i). Contraction of moa alii, name of one of the Pele family (Thrum).

Ka moa o Pele. The fowl of Pele.

Kaulupo (Ka-ulu'-po). The night growth (Thrum).

Mauna Hina (Hi'-na). Mount Hina. (Hina, the traditional mother of Ma-ui.)

Namana o ke Akua. Wonders of evidences of the deity (Thrum).

Oili Puu (o-i'-li). Hill shot out (Thrum). To be distinguished from Puu Oili.

Puu Nole. Nole means to chide, to grumble secretly (Andrews).

Puu Hele. Moving hill (Thrum). Probably means the hill where people pass (Emory).

Puu Kauaua (Ka-u-au'-a). The haughty one.

Puu Kumu. Foundation hill (Thrum).

Puu Maile (Mai'-le). Maile hill. Named for the fragrant evergreen vine (Thrum).

Puu o Pele. Hill of Pele. Pele is supposed to have made the crater one of her abodes.

Puu o Maui (Ma-u'-i). Hill of the demi-god, Maui.

Puu Naue (Na-u'e). Trembling hill (Thrum).

SLEEPING CAVES

Holua (Ho-lu'-a). Place for playing the ancient sliding game, holua (Thrum). Cave of the North Wind (Emory).

Ilailau (I-lai'-lau). Ilailau is an edible plant.
Kiikii. To make hair artificially white (Thrum).
Laie. A common place name.
Ana ma ka Uahi. Cave by the smoke.

PITS

Kawilinau (Ka-wili-na'u). The twist of pain (Thrum). Perhaps the twisting of an object let down into the pit by a thread.
Na Piko Haua. Hiding place for navel strings.

OTHER NAMES

Halemauu (Hale-mau'-u). Grass house situated north of Leleiwi. (Incorrectly located on the Hawaiian Government Survey map.)
Haleakala (**Hale a-ka-la**). House of the sun. Properly the name of a peak on the south wall of the crater. The peak has two summits, commonly referred to as Number 1 and Number 2.
Kalahaku (Ka-la-ha'-ku). Meeting place of leaders.
Kalapawili (Ka-la-pa-wi'-li). Winding or twisting ridge.
Kaluanui (Ka-lua-nu'-i). The big pit. Name of the crater below Palaha, and also of the peak at the end of the ridge.
Kapalaoa (Ka-pa-la-o'-a). The ivory ornament.
Keaku (Kea-ku'). Standing clear or universally white (Thrum).
Keoneheehee (Ke-one-hee-he'-e). Sliding sand.
Keonehili. Braided sand.
Keonekapu. Sacred sands. To scratch or pollute these sands is supposed to bring down the fog and cause one to lose his way and perish, as did the woman and two men whose traditional grave is a few feet east of Pa Puaa o Pele.
Kuiki (Ku-i'-ki). Stand a while (Thrum).
Kumuiliahi (Ku-mu-ili-a'-hi). Sandalwood stump.
Lauulu (Lau-u'-lu). Breadfruit leaf.
Pakaoao (Pa-kao-a'-o). Sleeping shelters built under the supervision of Aoao (Mr. L. A. Thurston).
Palaha (Pa-la'ha). Spread out flat (Thrum).
Paliku (Pa-li'-ku). Standing cliff. Term used for several different cliffs.
Pa Puaa o Pele. The pig pen of Pele.
Puali o Koa Nui o Kane. Company of big soldiers of Kane. Or, if Puali means here a gap in a ridge, gap (guarded by) of the big warrior, Kane.
Hanakauhi (Ha-na-ka-u'-hi). Perhaps, maker of mists, or giver of protection. Uhi means a veil or covering, and also to protect or hide.
Waikau (Wai-ka'-u). The natives gave the **k a t** sound (wai-tau).
Waikekeehia (Wai-ke-kee-hi'-a). Crooked waters.

SUMMARY OF THE SURVEY

The survey of Haleakala has revealed the existence of 58 stone terraces and platforms, 9 groups of open stone-shelters, several hundred ahus, and a section of an ancient paved road. The time at our disposal was sufficient to examine, measure, and photograph these structures, to make a plane table survey of

Naue, Halalii, and Hanakahi and to collect archaeological specimens. Of the 101 slingstones picked up in the Crater, none were artificially shaped. They may have been used by natives in hunting flocks of plover. We excavated and then restored 5 platforms, 10 terraces, and 3 ahus.

The construction of the terraces and platforms was determined and some evidence obtained regarding their age and purpose. A satisfactory explanation of these structures must await a comparative study of Hawaiian stone structures elsewhere.

The small terrace (fig. 3, *D*) under the northeast dike in the Halalii Crater appears to have been constructed to conceal the human remains found there, but it is unlikely that all the structures in Halalii were built for this purpose. Some of them, in particular the skilfully made top terrace in the series of five, may antedate all burials.

During the course of the work I gained the impression that the facts are opposed to the view that the terraces and platforms are either house foundations, fortifications, places for hiding things, or burial sites. The only feature which these mysterious structures seem to have in common is a square or rectangular paved flat surface, from 1 to 6 feet above the ground, from 3 to 20 feet wide, and from 4 to 40 feet long. The terrace may have served a different purpose from the platforms, but if a flat surface was the result desired, they may have been used for a single purpose as altars upon which sacrifices were laid. An altar would naturally assume the shape of a platform when erected on level ground, and of a terrace when erected upon a slope. If these platforms are altars and peculiar to the Haleakala region, they would represent altars to a special or local deity, perhaps to Lilinoe, Goddess of Haleakala.

NOTE BY THOMAS G. THRUM

The various ruins described by Mr. Emory are probably associated with the contentions of the ancient kings of West Maui for the coveted districts of Kaupo, Kipahulu, and Hana with its strategic point, Kauiki. That the route through the crater by way of Kaupo Gap was the established course, is evidenced by the stone-marked roadway and dam building of Kihapiilani,[4] a king of Maui, "who caused the road from Kawaipapa to Kaholaoaka to be paved with smooth rocks, even to the forests of Oopuloa, in Koolau, Maui."

The stone shelters are a necessary protection against the fog, rain, and cold wind frequently experienced at high altitudes. A number of shelters on the rim of the crater are known to be of modern construction. Some of them may have been used as stations for robbers, the professional *olohe,* who waylaid travelers in out of the way places, for several well-known localities in the islands are traditionally known as headquarters for robber bands. So important a route for the trade of Maui is not likely to have been overlooked.

The use of the craters within Haleakala as burial places, far removed from places of habitation, is quite in keeping with ancient Hawaiian practice. Distance and difficulties were no bar to faithful execution in carrying out the instruction of a dying relative or friend.[5]

Tradition refers to several localities on Haleakala as burial places of the chiefs of Nuu.[6] One such cave was known to be used by people of Hawaii.[7]

The five-terraced structure in Halalii crater (Pl. XXII, *B,* and fig. 3, *E*) resembles the four-terraced heiau of the Polihale temple at Mana, Kauai, but its location and the buried bones within its walls indicate perhaps a different purpose in construction. Occasional burials in heiaus took place, but they appear to have been rare and restricted to high chiefs and priests, persons qualified to conduct religious ceremonies. Women were strictly kapued from entering a heiau's sacred precincts in life, so naturally would not be allowed to desecrate it in death.

It is not improbable that the structure in the commanding location on Summit Number 1 is a heiau, though the bards make no mention of it. If such it was no doubt—like the heiau formerly on the rim of Kilauea—designed for the worship of Pele, but to be lost in tradition must have long antedated the Kilauea structure.

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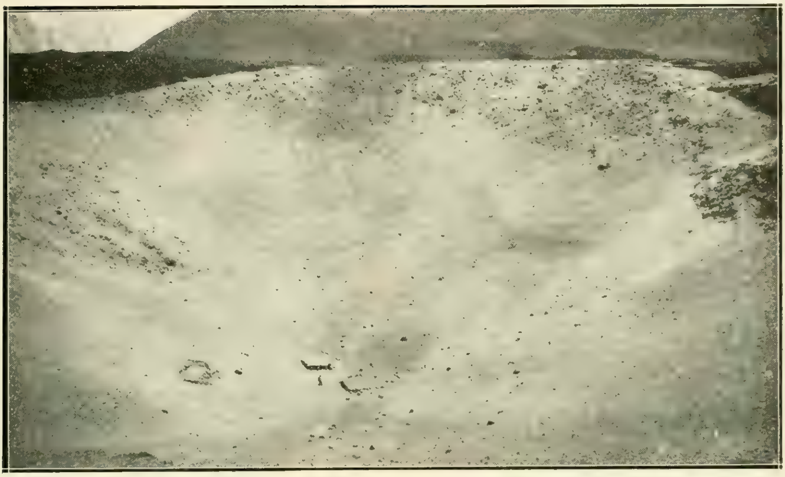
[4] B. P. Bishop Mus. Mem., vol. 5, p. 176. 1918-1919.
[5] Idem, vol. 4, pp. 232-234. 1916-1917.
[6] Idem, vol. 5, pp. 570-72, 1917-'18.
[7] Pogue, J. F., Ka Moolelo Hawaii, p. 30, Honolulu, 1858.

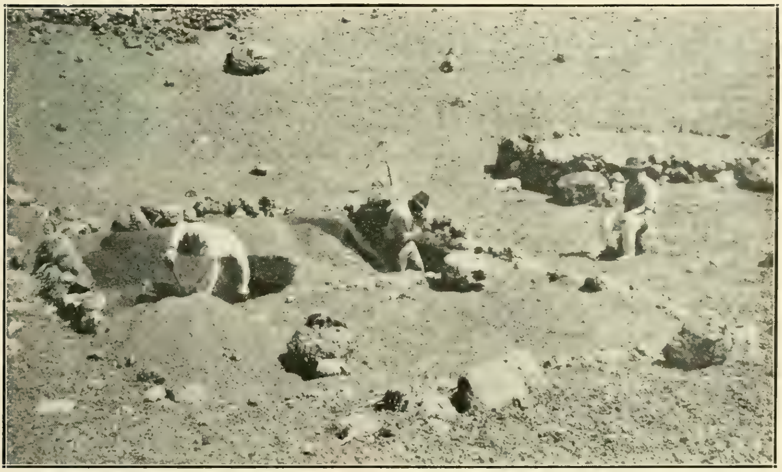
Reference to the place of deposit of the "umbilical cords of Kaupo babies" (page 16), and to the superstitions relating to the practice illustrates the strong hold of ancient customs on Hawaiians. The practice may be traced back a thousand years or more, and throws light on the name chants of Puna-imua, Hema, Kahai, and others, which mention not only the place of deposit of the *piko* (umbilical cord) but other evidences of birth, hid in different locations, an ancient method, it may be, of birth registration. Whatever may have been the original design in the custom, the facts recorded in name chants may be used as a means of identification, or proof, of Hawaiian birth, particularizing it to locality. It is evidence which may be used to refute New Zealand's claim that these celebrated pioneers in Pacific voyaging came from the Southern Seas.

The various sizes of the numerous ahus mentioned by Mr. Emory need occasion no surprise, considering the various purposes for which they were customarily designed. It was a recognized custom of Hawaiians to erect stone piles—pile is one meaning of the word ahu—as way marks, memorials of parties traveling or resting, division points of survey, and also as guides to the most accessible routes of travel. One such marks the safest of three ridges leading from the rim of the crater to the district of Nuu. That some ahus mark burial places is in accord with the present practice in certain districts of Maui and of Hawaii, and perhaps elsewhere. Most, if not all, of the ahus of three stones, one upon another, are tributes to the deity of the locality and are designed by travelers to assure safety in their journey.

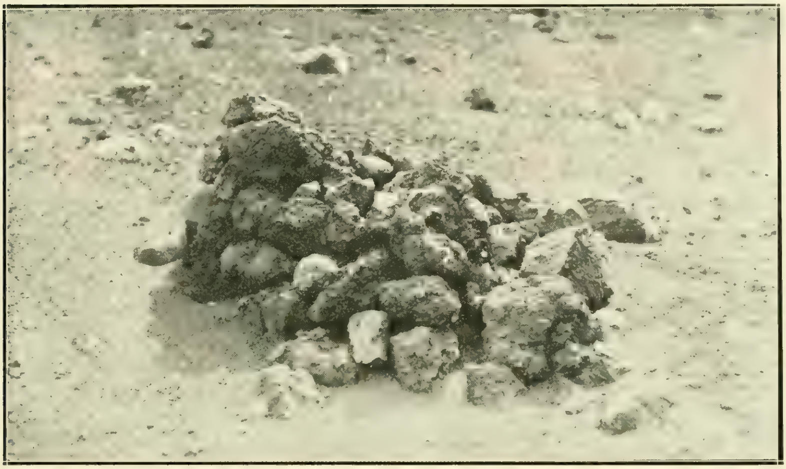


A. PLATFORMS IN PUU NAUE CRATER VIEWED FROM THE HIGHEST POINT ON THE RIM.

A man and dog stand at the bottom.

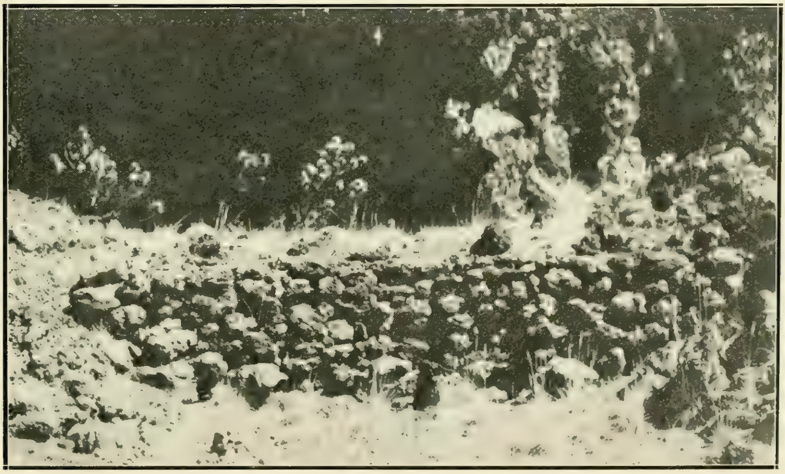


B. EXCAVATING IN THE SOUTH PLATFORM, PUU NAUE GROUP. THE EAST PLATFORM SHOWS ON THE RIGHT AND THE NORTH PLATFORM IN THE UPPER LEFT CORNER.



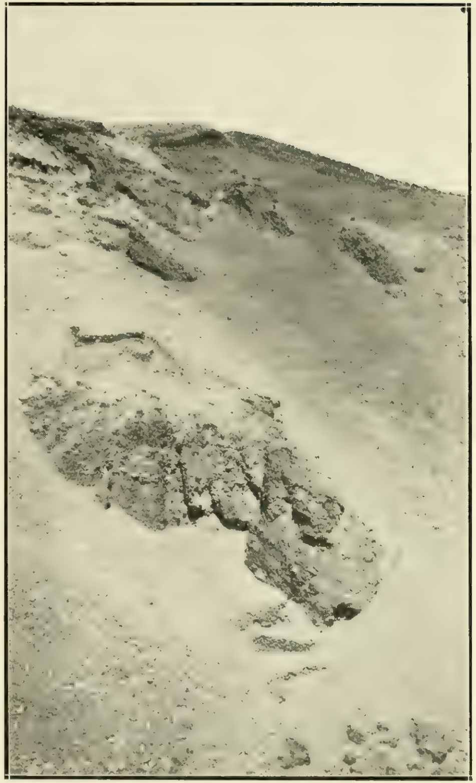
A. BURIAL AHU IN KAMOA O PELE FROM NORTHEAST.

Photograph by R. T. Aitken.

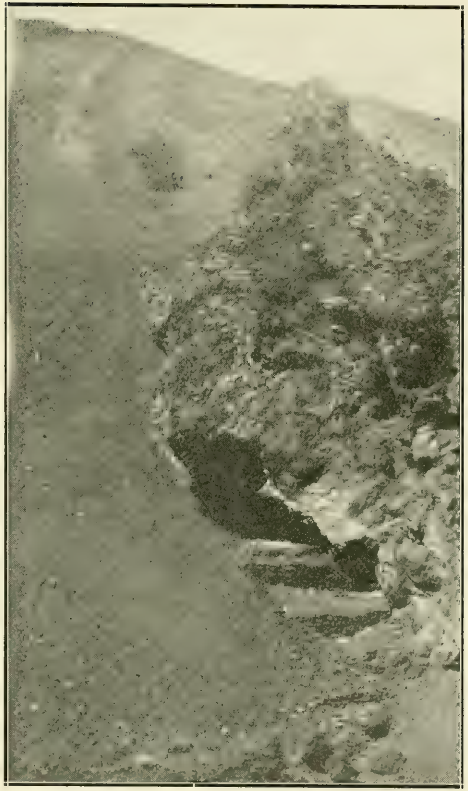


B. LARGE SINGLE TERRACE, HALALII GROUP.

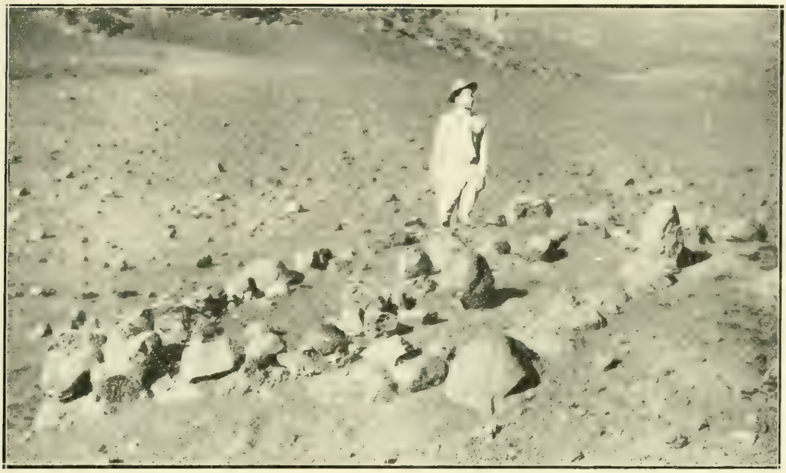
Photograph by R. T. Aitken.



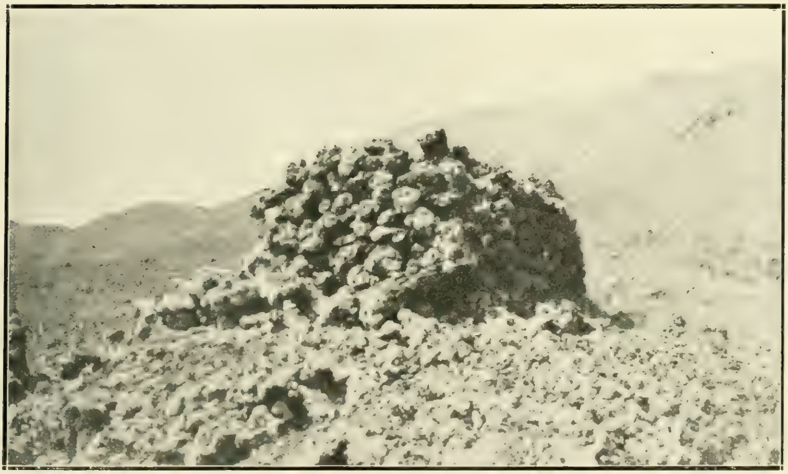
A. PLATFORM AND SERIES OF THREE TERRACES, HALALII



B. SERIES OF FIVE TERRACES, HALALII.



A. NORTH PLATFORM, HANAKAUHI GROUP.



B. NORTH PLATFORM, LAIE GROUP. A TYPICAL PLATFORM ON THE LAVA.

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Notes on Hawaiian Zonitidae and Succineidae

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INTRODUCTION

The material on which the present paper is based forms part of the malacological collection of the Bishop Museum. In 1920 I took to Philadelphia for comparative study the animals and shells of Hawaiian representatives of the families of Zonitidae, Endodontidae, and Succineidae and worked out there the anatomy of a number of the Zonitidae and Succineidae, but was unable to complete the analysis for lack of sufficient material. These notes deal with several genera of Succineidae and with three of the rarest genera of Zonitidae found in Hawaii. For comparison with the Hawaiian forms the very rich collection of wet material in the Academy of Natural Sciences was placed at my disposal in Philadelphia by Dr. Henry A. Pilsbry, to whom I am also indebted for advice and many courtesies. Thanks are due also to Miss Helen Winchester, who made the drawings for the two plates.

ZONITIDAE

Godwiniinae

Sykes[1] proposed the generic title of Godwinia for Gould's *Vitrina caperata*, basing his conclusions on the anatomical studies of Godwin-Austen. From a further study of the anatomy it appears that a new subfamily title is necessary. The shells are rather small, 8-13 mm. in diameter, of few rapidly enlarging whorls, and a large aperture; the embryonic whorls are more or less distinctly and roughly, distantly and radiately costate; the umbilicus is small and circular.

Unfortunately the animals in all the specimens examined were much contracted. As shown by Godwin-Austen there are no shell-lobes. Both right and left dorsal lobes are strongly developed. The sexual orifice is situated rather high and is back of the pulmonary orifice (fig. 3, *a*). There is no tail pore or slit. The penis is entirely different from that of other zonitoid snails. It is rather large with a very short stout retractor. The distal end is slightly enlarged into a head and is very thick walled with a minute almost median cavity. Near its base, the penis of most of the specimens examined bears a large saccate protuberance (fig. 1, *a, b,* and *f*); the vas deferens enters at the distal end of this protuberance and is imbedded within the wall of the penis (at x, fig. 1, *d*), and empties into the penial cavity just at or below the head of the penis (exactly where could not be determined from the specimens at hand). In spcimens of *Godwinia haupuensis* (fig. 3, *d*) the penis is pyriform, widest near the base, and the vas deferens enters the wall just below the middle of its length.

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[1] Sykes, E. R., Mollusca: Fauna Hawaiiensis, ii, p. 277, 1900.

The right tentacle does not pass between the male and female genital organs but between these organs and the buccal mass and under the main nerves leading to the genitalia.

The central and lateral teeth, as pointed out by Godwin-Austen, are unicuspid, but the cusp bears cutting points on both sides. In the centrals these cutting points are nearly opposite to each other, while in the laterals the inner and less distinct point is considerably higher than the outer. There are 4 perfect laterals, 2 to 4 transitionals, and from about 18 to 32 aculeate unicuspid marginals, the number depending on the age and species of the snail.

The members of this subfamily are known only from the island of Kauai. They are rarely found in abundance and are usually taken in thick, damp ferny jungle above the thousand-foot level, crawling on damp dead leaves. A very few specimens have been found on the under surface of fronds of low-growing ferns.

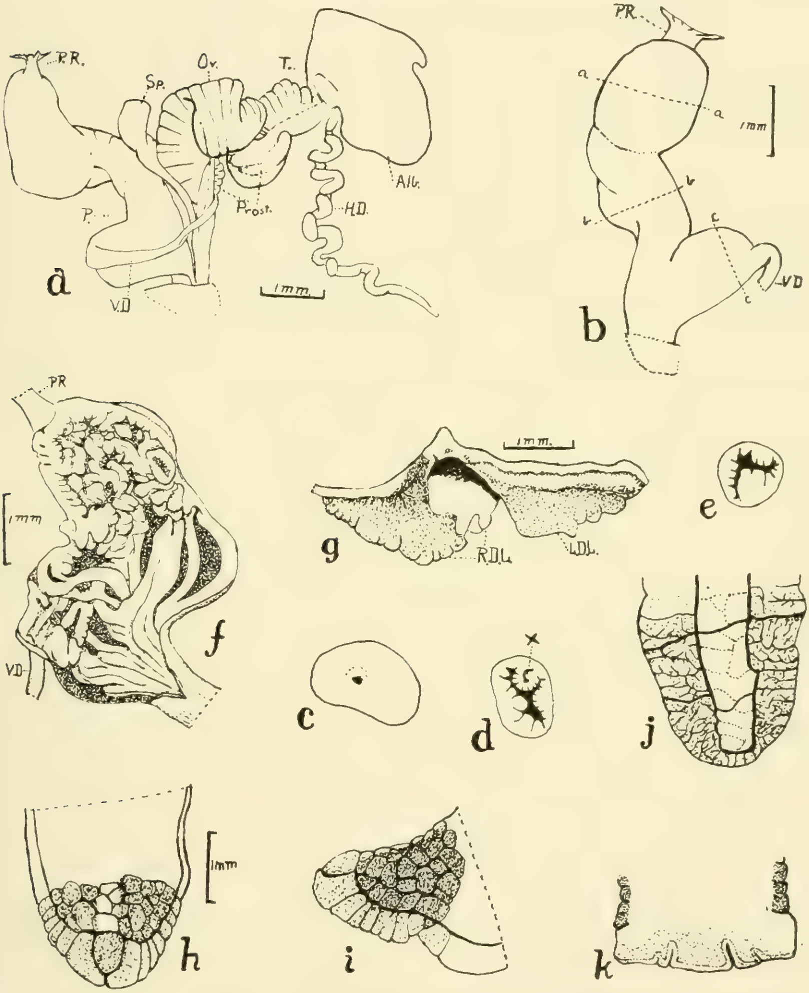
GODWINIA

Godwinia caperata (Gould). Pl. XXIV, 4; figs. 1 and 2.

Vitrina caperata Gould, Proc. Boston Soc. Nat. Hist., ii, p. 181, 1847; Moll., U. S. Expl. Exped., xii, p. 10, Pl. 1, 9, 9a, 1852.

Godwinia caperata Sykes, Fauna Haw., ii, Moll., p. 277, 1900.

This species has been collected on the highlands north and northwest of the Waimea Canyon. It is more abundant on the northern rim near the Waiakoali and Kawaikoi drainage basins than farther west. The specimen figured (Pl. XXIV, 4) is not quite typical as the periphery is slightly more rounded than that of Gould's figure. This specimen came from near Waiakoali Valley. Specimens from Kawaikoi Valley (Bishop Mus. No. 16743) agree very closely with Gould's description and figure.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LDL.
e
c
x
d
j
1mm
h
i
k

FIGURE 1. *Godwinia caperata* (Gould): **a**, genitalia; **b**, penis; **c**, cross section of penis at *a-a;* **d**, cross section of penis at *b-b* (x indicates position of seminal duct in the penis); **e**, cross section of penis at *c-c;* **f**, penis opened longitudinally to show arrangement of internal muscles; **g**, pulmonary orifice with right and left dorsal lobes; **h**, tail from above; **i**, tail from the side; **j**, under surface of foot; **k**, cross section of foot. (**b**, **c**, **d**, and **e** are drawn on the same scale; **h**, **i**, **j**, and **k** are drawn on the same scale.)

a, **b**, and **f**. *Alb,* albumen gland; *HD,* hermaphrodite duct; *Ov,* oviduct; *P,* penis; *PR,* penial retractor; *Prost,* prostate gland; *Sp,* spermatheca; *T,* talon; *VD,* vas deferens. **g**. *LDL,* left dorsal lobe; *RDL,* right dorsal lobe.

The color of fresh specimens is olive-lake, with a narrow indistinct reddish coloration accompanying and extending slightly below the suture; the outer and columellar margin of the aperture is edged with a narrow vinaceous line. There are 1½ embryonic whorls which are sculptured with distant broad low radial costae, high at the suture and disappearing below, the costae and interstices covered with very minute regular close spiral striae. Alt. 8.0 mm., diam. 12.3 mm., 3½ whorls (figured specimen).

The animal is uniformly very dark externally except for a broad light band accompanying the ridge of the tail (fig. 1, *h*). The sides of the foot below the pedal grooves are much lighter in color than the flanks of the animal (fig. 1, *i*). There is no distinct tail-pore or slit; but the tail ends above in a rather distinct button. The external portion of the dorsal lobes is a uniform slatey color (fig. 1, *g*). The mantle is densely and almost uniformly maculated with dark pigmentation.

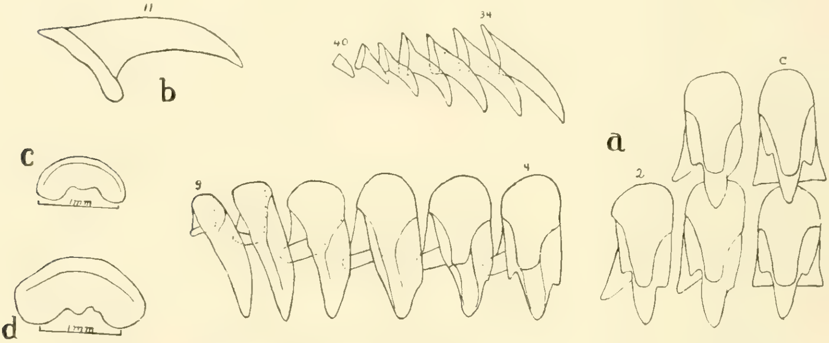

FIGURE 2. *Godwinia caperata* (Gould). **a**, teeth (*x* 250); **b**, profile of eleventh lateral (*x* 250); **c** and **d**, jaws.

The genitalia are simple. The albumen gland is large, trapezoidal in outline. The oviduct is strongly twisted on itself and can not be straightened out without breaking. The spermatheca is irregularly pyriform and united to the vagina by a short duct. The prostate gland is on the inner surface of the oviduct, which it nearly equals in length. The penis is large, more or less cylindrical in outline, its distal third somewhat swollen, bearing near its base a prominent swelling into which the vas deferens enters. It is made up of tough muscular tissue and is without any sheath. The vas deferens is simple, without any convolutions, and enters the distal end of the protuberance borne on the base of the penis. This protuberance has a large cavity (fig. 1, *e*) which narrows down to a much smaller diameter near the middle of the penis (fig. 1, *d*, at x) and probably empties into the narrow duct in the distal third of the penis.

The tooth formula is 1–4 (4)–32. (1–40.)

Godwinia haupuensis new species. Pl. XXIV, 3; fig. 3.

The shell is thin, with a dull upper surface, narrowly umbilicate, dark olive-buff, much lighter below the periphery, with a low broad conical spire and bluntly angulate at the periphery. Whorls 3½, slightly convex, separated by a deep suture. The first whorl and a half are roughly sculptured, the costae broad and slightly arcuate. On the next whorl the sculpture consists of closely packed, distinct, rather arcuate costae; on the upper surface of the last whorl the costae are more irregular in height and position than on the first and second, and on the lower surface the costae are more delicate and are very evenly spaced. The last whorl descends so slowly that the periphery of the penultimate slightly overhangs the suture. Aperture rather large, its outlines straighter above, more curved below, and its margins slightly approximating.

Height 5.1, maj. diam. 8.4, min. diam. 6.6; apert. height 4.1, diam. 5.5 mm.

Kauai: Northern slope of Mount Haupu in the southeastern portion of the island.

Type 58469 Bishop Museum; paratypes 17831 Bishop Museum and Academy of Natural Sciences, Philadelphia.

Godwinia haupuensis is quite distinct from *Godwinia caperata.* The shell is smaller with the same number of whorls, thicker with a much duller and more distinctly costate surface; the peripheral keel is also more pronounced. The "sinuous, branching furrows" mentioned by Gould and characteristic of *G. caperata* are entirely lacking in adults of this species. They are faintly developed in juvenile specimens where the shells are much thinner.

The upper and side surfaces of the foot (fig. 3, *a*) are dark colored except below the pedal grooves which are light; the sides of the head are also light colored. There is no distinct button near the end of the tail (fig. 3, *b*) as in *G. caperata.* The mantle is light except for two slightly dark patches of pigment, one over the heart and kidney and one over the intestine and ureter. The collar of the mantle is only slightly pigmented. The lung and the organs situated near and on it (fig. 3, *c*) are similar in both species.

Genitalia (fig. 3, *d*). The female organs are very much alike in both species. The penis of *G. haupuensis* is, however, somewhat different from that of *G. caperata.* No protuberance near the base was found in any of the specimens examined. The vas deferens enters directly into the penis near its lower third. A short distance above this a cross section showed two nearly equal cavities (fig.

3, *c*). The distal third of the penes of both species are somewhat similar.

The teeth of both species are similar in form but in *G. haupuensis* there are fewer in each row. The formula of this species is 1–4(2)–23. (1–29.)

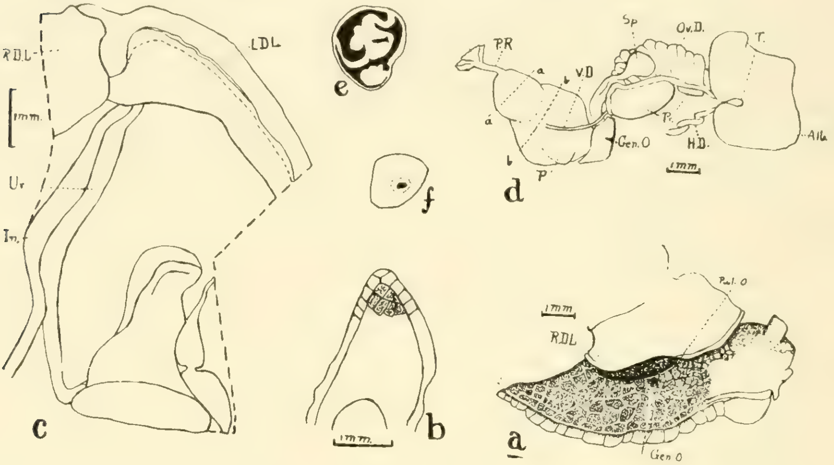

FIGURE 3. *Godwinia haupuensis,* new species: **a**, animal partly expanded showing the relative positions of the generative and pulmonary orifices; **b**, tail from above; **c**, lung; **d**, genitalia; **e**, cross section of penis at *b-b;* **f**, cross section of penis at *a-a.* (**d**, **e**, and **f** are drawn on the same scale.)

a. *Gen. O,* generative orifice; *Pul. O,* pulmonary orifice; *RDL,* right dorsal lobe. **c**. *In,* intestine; *LDL,* left dorsal lobe; *RDL,* right dorsal lobe; *Ur,* ureter. **d**. *Alb,* albumen gland; *Gen. O,* generative orifice; *HD,* hermaphrodite duct; *Ov. D,* oviduct; *P,* penis; *PR,* penial retractor; *Pr,* prostate gland; *Sp,* spermatheca; *T,* talon; *VD,* vas deferens.

VITRINA

Vitrina tenella Gould. Pl. XXIV, 2; fig. 4.

Vitrina tenella Gould. Proc. Boston Soc., ii, p. 181, 1847; Moll., U. S. Expl. Exp., p. 11, Pl. I, fig. 10, 1852.
Godwini (?) *tenella* Sykes, Fauna Haw., ii, Moll., p. 278, 1900.

Kauai (Gould); Maui, Haleakala 5000-9000 feet (Perkins, Cooke); Hawaii, Kukaiau (Thaanum), 1823 flow at 7000 feet (Forbes), Waikii (fossil).

Gould gives Kauai as the locality of this species, but I am sure that this must be a mistake. His description and figure agree closely with specimens from Maui and Hawaii. As stated by Sykes, specimens have not been found on Kauai by any of the later collectors. Gould's diameter, 1/3 in. (8.3 mm.) (1/3 × 1/11 in.) is probably erroneous, as his figure (natural size) measures 4.8 mm. in diameter.

Owing to the small amount of available material from the island of Hawaii it seems best that the Hawaii form should be included at present with Gould's species from Maui. Some of the specimens are slightly larger than any that I have known to be found on Maui.

The size of the specimens from Hawaii as compared with those from Maui is shown in the following table:

Locality	Max. diam. mm.	Min. diam. mm.	Altitude mm.	Number of whorls	Bishop Mus. No.
Maui	5.2	3.7	3.0	3	58473
Maui	4.6	3.2	2.6	3	58473
Hawaii	6.1	3.9	3.7	3¼	58472

The embryonic whorls of specimens from Maui and Hawaii are minutely punctate, as in the American and European species of this genus, the punctation being arranged in spiral rows. Fresh specimens are transparent chartreuse-yellow according to Ridgway's color nomenclature. The only material available for dissection was a very much contracted alcoholic specimen, an animal collected by Forbes on the island of Hawaii. Unfortunately the tip of the tail had been broken off and the presence of a pore could not be determined. The sides of the foot were dark slate-colored, the sole slightly lighter in color; the central area, about one-third the diameter of the foot, being much lighter. The dorsal and shell-lobes were very much contracted and intensely pigmented. The right shell-lobe is long and narrow and extends beyond the pulmonary orifice. The right dorsal lobe is short, almost triangular, and very thick. The left shell-lobe is short. The anterior left dorsal lobe is short and triangular in outline; the posterior left dorsal is broad in front, long and narrow behind. The mantle is light yellowish flesh-colored, indistinctly and minutely stippled for a short distance above the collar.

The right tentacle retractor does not pass between the oviduct and penis but between the genitalia and buccal mass and under the main nerve leading to the genitalia. This same arrangement was found in specimens of *V. alaskana* Dall (A. N. S. P. 107017).

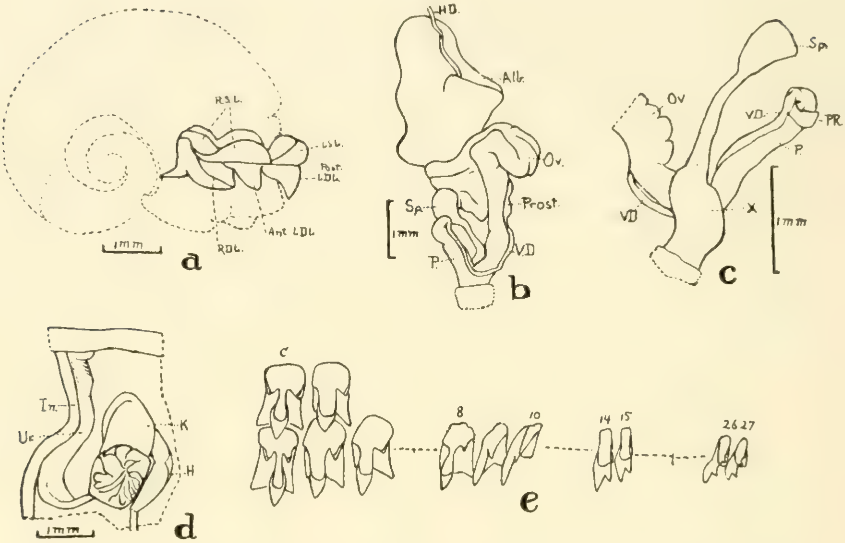

Figure 4. *Vitrina tenella* Gould: **a**, animal, much contracted, showing position of dorsal and shell-lobes; **b**, genitalia, ventral aspect; **c**, lower genitalia drawn to a larger scale, dorsal aspect (x, the enlargement at the base of the spermatheca); **d**, lung; **e**, teeth (× 380).

a. *Ant. LDL,* anterior left dorsal lobe; *LSL,* left shell-lobe; *Post. LDL,* posterior left dorsal lobe; *RDL,* right dorsal lobe; *RSL,* right shell-lobe. **b**. Alb, albumen gland; *HD,* hermaphrodite gland; *Ov,* oviduct; *P,* penis; *Prost,* prostate gland; *Sp,* spermatheca; *VD,* vas deferens. **c**. *Ov,* oviduct; *P,* penis; *PR,* penial retractor; *Sp,* spermatheca; *VD,* vas deferens; *x,* enlargement at base of spermatheca. **d**, *H,* heart; *In,* intestine; *K,* kidney; *Ur,* ureter.

The pulmonary vein could not be made out in the specimen. The kidney is saccate in outline; the basal portion is shown opened (fig. 4, *d*). The ureter accompanies the right side of the kidney, passing over to the intestine near the base of the kidney; it enlarges rather abruptly just before reaching the intestine and continues forward as a broad duct.

The genitalia are extremely simple. The albumen gland is very large, roughly triangular in outline. The oviduct is tightly twisted. The spermatheca is rather large, its duct medium in length and broad, enlarging at its base and uniting with the oviduct close to the cloaca (fig. 4, *c* at x). The penis is simple cylindrical, about 1½ mm. in length. The vas deferens is closely united to and accompanies the penis, entering close to the distal end of the latter organ. The penis retractor is very short and united to the penis and vas deferens just below their union.

The teeth are typical of the genus, the formula being 1–8–32; the central with a rather long cutting point and two minute ectocones; the laterals with a long indistinct inside cutting edge and a short distinct ectocone. The inner marginals are distinctly bifid but without denticles on the outer margin. The very outermost marginals have about two minute denticles on their outer margin.

The finding of typical specimens of this holarctic genus in the Hawaiian shell fauna is hard to explain. There can be no doubt that they are endemic to the Territory of Hawaii and not of recent introduction, as all the specimens that have been collected were found at high altitudes (3000-8000 feet), and the possibility that specimens were accidentally introduced in places remote from human habitation is very slight. Furthermore the presence of this species in the Pleistocene fossil deposits of Waikii, Hawaii, is a strong argument against the theory of accidental introduction.

NESOVITREA new genus

Vitrea-like snails; whorls about four, the first whorl smooth, the rest minutely but distinctly striate. Aperture simple, outer margin thin, sharp. Umbilicus rather shallow, perspective showing all the whorls.

Contracted alcoholic specimens of the animals are without distinct shell-lobes, but have a strong right dorsal lobe, an anterior left dorsal lobe almost as well developed, and a long narrow posterior left dorsal lobe. Lateral pedal grooves are well developed, but there is no indication of a tail pore or slit in any of the much contracted animals examined. The spermatheca is attached to the base of the uterus very close to the latter's insertion on the cloaca.

Type *Vitrea pauxillus* Gld., from Maui.

The name Nesovitrea is proposed for a small group of very closely related species from the Territory of Hawaii.

Besides the type this genus is made up of the following species:

Vitrea (?) *lanaiensis* Sykes, Proc. Mal. Soc. London, ii, p. 298, 1897. Fauna Hawaiiensis, ii, Pl. XI, figs. 43, 44, 1900.

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[2] Hawaiia Gude (Gude, G. K., Note on some preoccupied molluscan generic names and proposed new genera of the family Zonitidae: Proc. Mal. Soc. London ix, p. 272, 1911) was originally based upon *Helix kawaiensis* Pfr., and was said to equal Hyalina and Pseudohyalina in part. *H. kawaiensis* had been referred to Pseudohyalina by Sykes (Fauna Haw., ii, Moll., p. 279, 1900). Mr. Gude subsequently in an undated leaflet proposed to change the type of Hawaiia to *Helix hawaiiensis* Ancey; but no *Helix hawaiiensis* was ever described by Ancey, nor was this specific name ever used by him in Hyalina or Pseudohyalina. We are therefore compelled to adhere to Mr. Gude's original designation of *Helix kawaiensis* Pfr. as the type of Hawaiia.

Vitrea (?) *molokaiensis* Sykes, Proc. Mal. Soc. London, ii, p. 298, 1897. Fauna Hawaiiensis, ii, Pl. XI, figs. 45, 46, 1900.

Vitrea (?) *hawaiiensis* Anc., Proc. Mal. Soc. London, vi, p. 120, Pl. VII, figs. 8-8b, 1904.

Nesovitrea pauxillus (Gould). Pl. XXIV, 1; fig. 5.

Helix pusillus Gould, Proc. Bost. Soc., ii, p. 171, 1846.

Helix pauxillus Gould, Moll., U. S. Expl. Exped., p. 40, Pl. III, fig. 46, 1852. *Vitrea pauxillus* Sykes, Fauna Haw., ii, Moll, p. 279, 1900.

Animals of all four species were examined and agreed very closely. The foot is light yellowish-white and has well-marked pedal grooves, but no tail pore or slit; the central section of the sole is extremely narrow, being slightly less than one-fourth the diameter of the foot.

All the animals examined were rather strongly contracted alcoholic specimens. There were no shell-lobes present. The right dorsal lobe in the contracted specimens is rather strong, as is also the anterior left dorsal lobe; the posterior left dorsal lobe is long and narrow. On the right side the collar is uniformly slate-colored, on the left side the collar is a lighter gray, and its upper portion is bounded by a dark-gray line. The right side of the mantle, from the right margin of the kidney to the intestine, is uniformly minutely and densely stippled with dark brown; the portion of the mantle covering the kidney is pale flesh-colored; the left side, below the kidney, is pale, indistinctly minutely stippled.

The pulmonary vein is indistinct. In a single specimen were seen minute branching veins extending downwards and to the left of the pulmonary orifice.

The generative organs are extremely simple. The albumen gland is proportionately large and long and is oblong in outline. The oviduct is not tightly twisted. Spermatheca rather small, with a long rather broad duct enlarging abruptly at its termination close to the base of the uterus. Penis very short and simple, cylindrical, about ⅔ mm. in length, with a long slender penial retractor attached at its distal end; vas deferens short, not accompanying the penis to its base.

The right eye retractor does not pass between the oviduct and penis as in most snails but between the buccal mass and genitalia.

The tooth formula is 1-8-30.

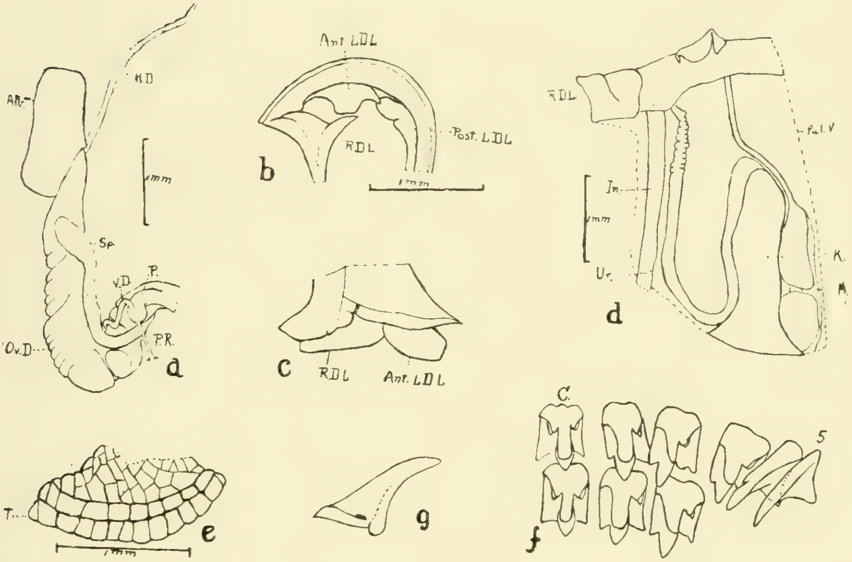


FIGURE 5. *Nesovitrea pauxillus* (Gould): **a**, genitalia; **b**, collar dissected from the rest of the animal, ventral aspect; **c**, collar, dextral aspect; **d**, lung; **e**, foot, somewhat contracted; **f**, teeth (× 410); **g**, profile of a marginal tooth (× 410).

a. *Alb.* albumen gland; *HD,* hermaphrodite duct; *Ov. D,* oviduct; *P,* penis; *PR,* penial retractor; *Sp,* spermatheca; *VD,* vas deferens. **b** and **c**. *Ant. LDL,* anterior left dorsal lobe; *Post. LDL,* posterior left dorsal lobe; *RDL,* right dorsal lobe. **d**. *H,* heart; *In,* intestine; *K,* kidney; *Pul. V,* pulmonary vein; *RDL,* right dorsal lobe; *Ur,* ureter. **e**. T, tip of tail.

SUCCINEIDAE

SUCCINEA

Succinea newcombiana Garrett. Pl. XXV, 4.

Succinea newcombianum Garrett, Proc. Cal. Acad. Sci., i, p. 103, 1857.
Succinea newcombiana Sykes, Fauna Haw., ii, p. 388, 1900.

Hawaii: Waimea (Garrett), Kohala (Perkins), Kaiwiki (Thaanum, no. 1143).

This species although almost as flat as *Catinella rubida* is, anatomically, a true Succinea. The shell is considerably flatter than that of *Catinella rotundata* Gld. This species was found in abundance by Thaanum at Kaiwiki.

The shells are pale chalcedony-yellow on the outside, whitish within; the growth-striae are very faintly marked. The parietal margin is furnished with a long thin plate which is separated from the upper outer margin of the aperture by a rather deep sinus. The aperture occupies nearly the whole of the shell. The figured specimen (Bishop Mus. No. 58474) measures 8.4 mm. in length, 6.8 mm. in diameter.

CATINELLA Pease

Pease proposed this generic title in the Journal de Conchyliologie (xviii, 1870), page 89, for *Succinea explanata* Gould and *Succinea putamen* Gould. On page 97 of the same work, he includes *Catinella rubida*, a new species, in the same genus with *C. explanata*. In the Proceedings of the Zoölogical Society of London (1871, page 459), he gives a generic description and selects *Catinella rubida* as the type of the genus.

Later authors have reduced Catinella as an absolute synonym or at the most have retained the name as a section or subgenus of the genus Succinea.

Anatomical studies of the animals of *Catinella rubida* and a number of other Hawaiian species formerly included in the genus Succinea lead me to believe that Catinella should be restored to generic rank. Unfortunately the number of species so far dissected has not been very large, but the additional material that will be available in 1922 will enable me to complete the work during that year. Most of the species formerly referred to Succinea, from Kauai, Oahu, and Molokai and some of those from Maui, in the form and arrangement of their genital organs resemble very closely *C. rubida*. Species referable to this genus differ considerably in the form and size of their shells. They also differ as to habits, as some are arboreal and others are terrestrial.

Catinella rubida Pease. Plate XXV, 1.

At an elevation of about 2000 feet, just below the swamp at Wahiawa, Kauai, I collected typical specimens of this species. Descriptions of the animals of this and other species from the Territory of Hawaii will be deferred until the anatomy of more of these species has been completed. The figured specimen measures 10.6 mm. in length and 7.8 mm. in diameter and is made up of nearly 1½ whorls; it is buckthorn-brown in color.

Catinella paropsis new species. Pl. XXV, 3.

The shell is rather flat, ellipsoidal in outline, slightly flattened at the sides, rather thick, nearly opaque, dull, and of a dark olive-buff color. Whorls about 1½, the spire immersed. The last whorl is somewhat convex above, its dorsal surface minutely striate with concentric lines of growth and in addition marked with faint, broken, slightly radiating shallow sulci, which are also visible when viewed from within. The aperture occupies nearly the whole of the ventral side, its outer margin slightly undulating and edged by a narrow dark line. The parietal wall is furnished with a rather broad long plate which terminates within the outer wall of the aperture and is separated from its margin by a deep sinus.

Length 11.7, diameter 7.5 mm.

Oahu: Kaipapau, near the summit of the Koolau Range (Cooke).

Type No. 19307, paratypes No. 19410, Bishop Museum, and also in the Academy of Natural Sciences of Philadelphia.

So far as known this species is entirely terrestrial in its habits; all the specimens were found on very damp dead leaves. This species is extremely rare; the collection of the Bishop Museum has only four lots from different colonies numbering altogether 15 specimens, most of which are immature. These were found in dark and damp heads of ravines near the summit of the Koolau Range between Punaluu and Kaliuwaa.

Catinella paropsis is entirely distinct from any of the species already described from the Territory of Hawaii. Its closest relatives (except the following species *Catinella tuberculata*) appear to be the extremely flat *Catinella explanata* and *Catinella rubida* from the island of Kauai. From these it differs in the greater convexity of the last whorl, the thickness of the shell, and the peculiar radiating dorsal sulci.

Catinella tuberculata new species. Pl. XXV, 2.

This species is represented in the Bishop Museum by two specimens. One is of about the same color as *Catinella paropsis* (dark olive-buff), the other, the type, is of a slightly darker shade. *Catinella tuberculata* is easily distinguished from *Catinella paropsis* by its tuberculate surface, the tubercules being formed by wrinkled anastomosing sulci, which are so deeply impressed into the structure of the shell that the inner surface of the aperture is distinctly malleate. The parietal plate is much narrower and less developed than in *Catinella paropsis.*

Length 11.2, diameter 7.6 mm.

Oahu: Mount Kaala (Thaanum). Type and paratype No. 36915, Bishop Museum; paratypes, Thaanum collection.

LAXISUCCINEA new genus

The shells are succineiform, the last whorl distinctly and bluntly angulate below its periphery, flattened ventrally, and forming a platform at and below the inner margin of the aperture. The margin of the aperture is entirely free and is not appressed to the last whorl as in other Succineidae.

Laxisuccinea is an interesting group of this rather conservative family. The separation of it from other Succineidae is based entirely on shell characters, but these characters appear to be of sufficient importance to necessitate the forming of a new genus. Unfortunately, the only two species which have been found are fossil. Both species are from the island of Kauai and were found in Pleistocene or Recent deposits near the sea, and each of the species was confined to a very limited locality. A search for living specimens was made in the vicinity, but none was found.

Type: *Laxisuccinea libera* new species.

Laxisuccinea libera new species. Pl. XXV, 6.

The shell is ovate, in its fossil state dull white with a slight yellowish tinge, irregularly marked with minute lines of growth. Whorls almost two; the first minute, very convex, and having a deep narrow suture; the last large, increasing very rapidly and occupying nearly the whole of the shell, bluntly but distinctly angled below the periphery and flattened ventrally just below this angle, its last fourth free, cornucopia-like. Aperture nearly ellipsoidal in outline, its margin free and erect, not attached either to the columellar or parietal wall. There is no indication of a parietal plate.

Length, 7.8, diameter 5.5 mm.

Kauai: in Pleistocene or Recent deposits in road cutting near the southern extremity of the Hanamaulu flat (C. S. Dole and Cooke).

Type No. 19539, Bishop Museum; paratype Academy of Natural Sciences of Philadelphia.

One whole specimen and five or six fragments are all the material I have been able to study, although to procure more material of this species two special trips were made to the identical spot where the first fragments were found. It is entirely unlike any other species of the family to which I have been able to refer, the free aperture seen also in *Laxisuccinea haena* is its most distinctive characteristic.

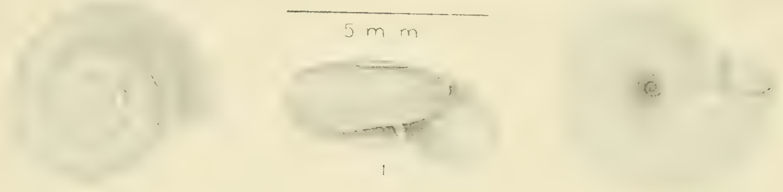
Laxisuccinea haena new species. Pl. XXV, 5.

The shell is broadly ovate, in its fossil state white, irregularly and unevenly minutely striate with lines of growth. Whorls 2½, the upper 1½ very convex with a deep suture, the last very large, occupying almost the whole shell, convex above, distinctly angled below the periphery and flattened ventrally just below the angle. Aperture oval, partly appressed to the parietal wall, but with its margin entirely free. There is no indication of a parietal plate.

Length 8.9, diameter 6.4 mm.

Kauai: in Pleistocene or Recent deposits in road cutting near the western extremity of the Haena Plain (Cooke). Type No. 58476 Bishop Museum, paratypes 37577 Bishop Museum, and also in Academy of Natural Sciences of Philadelphia.

Though less circular in outline, this species resembles, at first glance, *Catinella rotundata* Gould, from Oahu. It is, however, much more closely related to *Laxisuccinea libera* described above. Though the margin of the aperture is entirely free from the rest of the shell, its inner upper portion is partly appressed to the parietal wall. Evidently *L. haena* has not diverged so far from the parental Succinea-type as *L. libera* has done.



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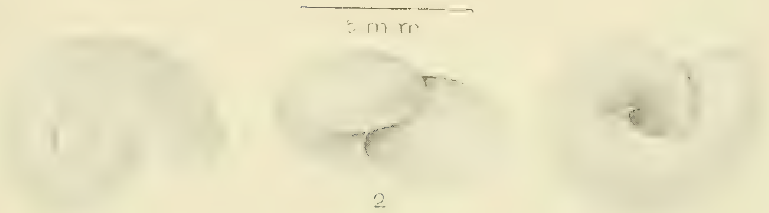

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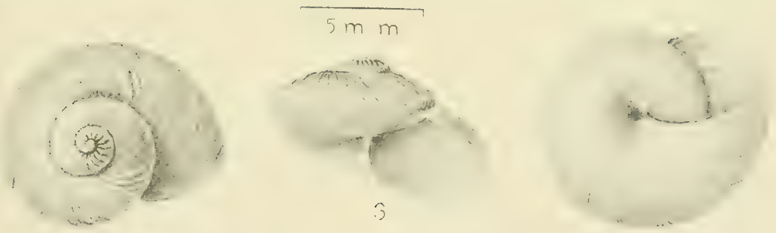

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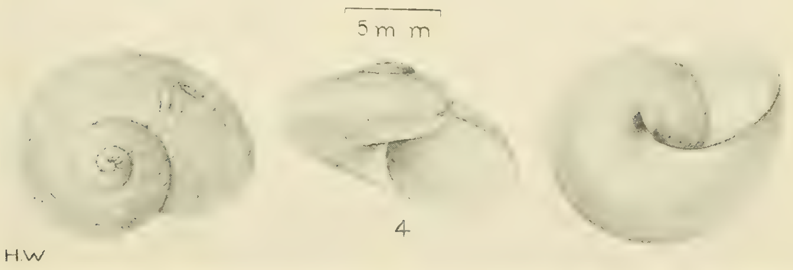

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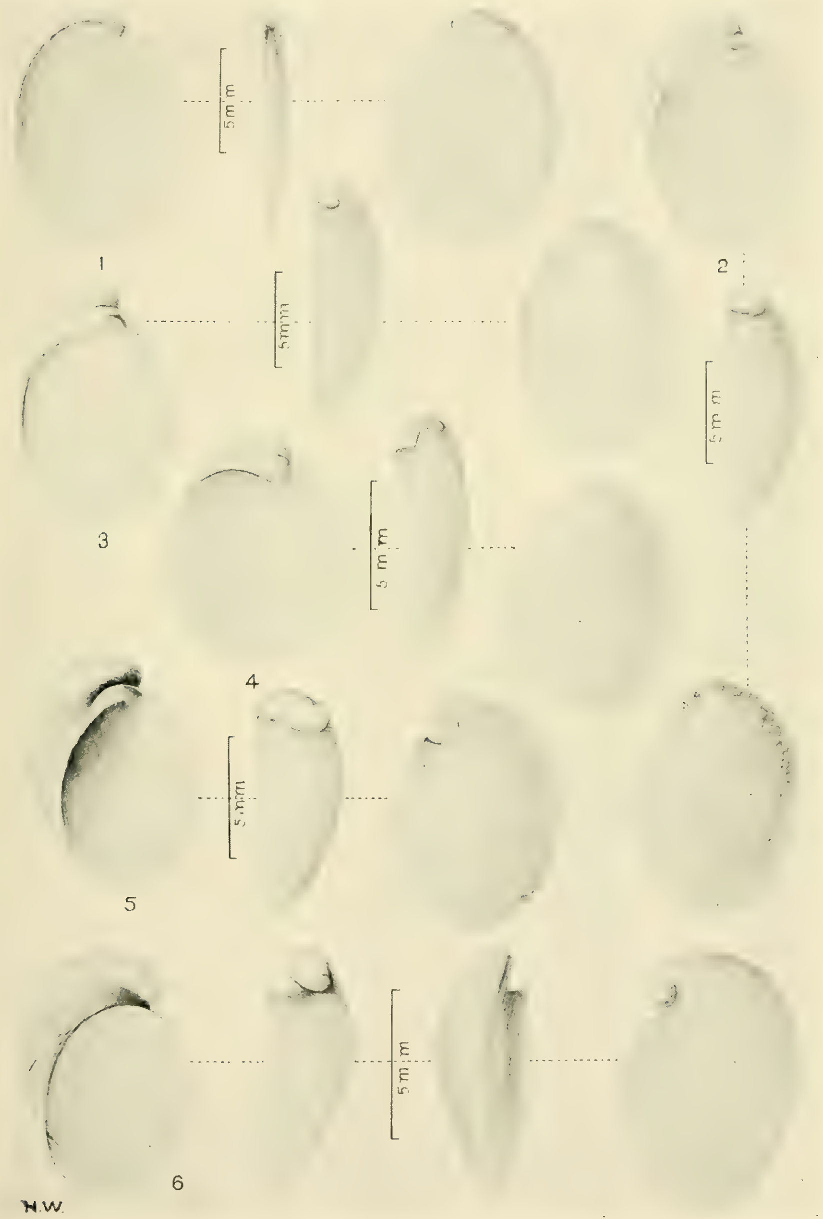
SHELLS OF ZONITIDAE: 1. NESOVITREA PAUXILLUS (GLD.); 2. VITRINA TENELLA GLD.; 3. GODWINIA HAUPUENSIS N. SP.; 4. GODWINIA CAPERATA (GLD.)

From drawings by Helen Winchester.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SHELLS OF SUCCINEIDAE: 1. CATINELLA RUBIDA PSE.; 2. CATINELLA TUBERCULATA C.; 3. CATINELLA PAROPSIS C.; 4. SUCCINEA NEWCOMBIANA GAR.; 5. LAXISUCCINEA HAENA C.; 6. LAXISUCCINEA LIBERA C.

From drawings by Helen Winchester.

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OCCASIONAL PAPERS

OF THE

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INTRODUCTION

The Stomatopoda which represent one of the higher orders of malacostracous Crustacea constitute a clearly defined group and may be recognized by the following characteristics.

The carapace is relatively small and only partly covers the cephalothorax, leaving at least the four posterior thoracic segments exposed. The rostrum is separated from the carapace by a distinct suture. The abdomen is well developed. The eyes are stalked and carried on distinct movable segments, as are also the first pair of antennae. The second pair of thoracic appendages are developed into raptorial limbs in which the terminal segment, called the dactylus, closes upon the preceding one, the manus, like a knife blade. Posterior to the raptorial limbs are three pairs of thoracic appendages constructed on the same general plan as the former but very much smaller. The three posterior thoracic segments bear biramous walking legs. Of the seven abdominal segments each of the first five bears a pair of appendages, the swimmerets, to which are attached tufted gills. The sixth segment also bears a pair of appendages, the uropods, which, with the seventh segment, the telson, serve as a tail fin.

All recent Stomatopoda are included in a single family, Squillidae, the characteristics of which are the same as those of the order.

In this group relationship between the several genera and also between species is based largely upon the peculiar features of the sixth and seventh abdominal segments, the raptorial limbs, the eyes, and the rostrum.

Brooks,[1] in tracing the generic relationship between the species, calls attention to the important significance of the accessory organ of the first abdominal appendage of the male stomatopod.

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[1] Brooks, W. K., Report on the Stomatopoda: Voy. H.M.S. "Challenger," Zoology, vol. 16, p. 13, 1886.

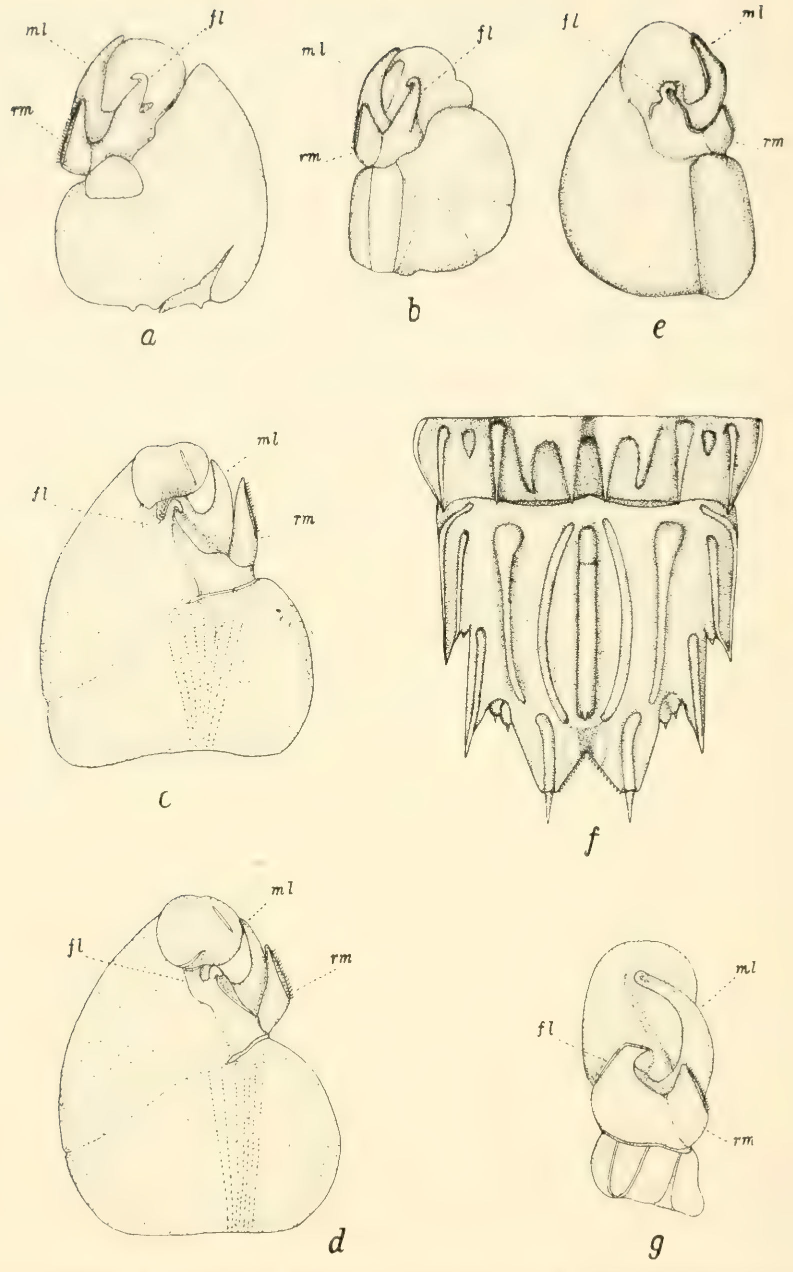

FIGURE 1. Accessory organs and segments of Stomatopoda (*rm*=retinaculum; *ml*=movable limb; *fl*=fixed limb):

a, Right accessory organ of male, *Squilla oratoria* (×5); **b**, right accessory organ of male, *Pseudosquilla oculata* (×10); **c**, left accessory organ of male, *Lysiosquilla maculata*, from Tahiti (×2½); **d**, left accessory organ of male, *Lysiosquilla maculata*, from Honolulu (×2½); **e**, left accessory organ of male, *Odontodactylus hansenii* (×13); **f**, sixth abdominal segment and telson of *Odontodactylus hansenii* (×5); **g**, left accessory organ of male, *Gonodactylus guerinii* (×10).

In all Squillidae this complicated organ is borne on the terminal segment of the endopodite of the first abdominal appendage and consists of three distinct portions: first, the retinaculum or external appendicular process (*rm*—fig. 1, *a-e* and *g*), which is medial in position, rounded proximally and pointed distally, with a flattened medial surface provided with rows of hooked spines which interconnect with those of the corresponding organ of the opposite appendage; second, the movable limb (*ml*—fig. 1, *a-e* and *g*) of the forceps of the organ, which projects at an angle across the surface of the endopodite, its free end, in most species, slightly curved and spoon-shaped; third, the fixed limb of the forceps (*fl*—fig. 1, *a-e* and *g*), which also extends at an angle across the endopodite and, in most species, terminates in a hook.

Brooks[2], Borradaile[3], Chilton[4], and others have figured and described the accessory organs of certain species of Squillidae. The characteristic features of the structure in additional species are presented in this report.

Although the Squillidae are known to inhabit the tropical, subtropical, and temperate oceans, yet the greater number of them have been taken from the warmer seas. Some are apparently localized in their distribution or at least have not been reported from widely separated regions, and others within certain latitudinal limits are extensively dispersed throughout the Indian, Pacific, and Atlantic Oceans.

A number of species of Squillidae are known to range considerably below the 100-fathom line. Bigelow reports *Squilla biformis* as having been taken in Panama Bay at 85-259 fathoms, and the "Investigator" took *Squilla leptosquilla* in the Indian Ocean at 370-419 fathoms. The larger number of known species are, however, confined to shallow water where they burrow in the sand or conceal themselves in the crevices of dead coral.

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[2] Brooks, W. K.: Op. cit., Pls. 1, 2, 10, 15, 1886.

[3] Borradaile, L. A., On some crustaceans from the South Pacific, Part 1, Stomatopoda: Proc. Zool. Soc. London, Pls. 5, 6, 1898.

[4] Chilton, C., Notes on the New Zealand Squillidae: Trans. New Zealand Inst., vol. 23, pl. 10, 1890; Revision of the New Zealand Stomatopoda: Trans. New Zealand Inst., vol. 43, p. 136, fig. 2, 1910.

The Stomatopoda are, without doubt, less abundant than some other well-known groups of Crustacea; their great agility when moving freely in the water and their powers of concealment, rendering their capture a difficult task, may, however, partly explain why a larger number of Squillidae have not been described. Up to the present time the number of species reported is probably below one hundred and fifty and, on consulting the literature, one finds that not a few of this number have been described from one or two specimens.

Although the collection of Stomatopoda in the Bishop Museum is at present not large, yet a considerable degree of interest is attached to it from a distributional point of view.

The collection comprises fifty-three specimens, grouped under six genera and nine species, one of which is new. Of the fifty-three specimens ten are recorded from Guam, four from Tahiti, and two from the Marquesas, the other thirty-seven being from Hawaii.

Representatives from the Hawaiian waters are listed under six genera and eight species. If one may infer from the frequency with which they are taken, three of the species of Squillidae found in Hawaiian waters exist in much greater number on the reefs and in the shallow water about the islands than do the other five species.

Pseudosquilla ciliata Miers, a widely distributed species, is very common on the reefs about Oahu. Another species of the same genus, *Pseudosquilla oculata* (Brullé), previously reported from the Canaries, Madeira, Cape Verde Islands, Mauritius, Chagos, Samoa, and the China Sea, has frequently been taken from the dead coral blocks on Waikiki reef, Honolulu. A third species, *Squilla oratoria* de Haan, more or less common in Chinese and Japanese waters, has several times been found in the Honolulu fish market during the present year, but the writer has never taken the species from the reefs about Oahu and is unable to say where the fishermen obtain it.

Other species of Squillidae taken from Hawaiian waters are, for the most part, represented in the Bishop Museum collection by single specimens.

More thorough and extensive surveys of the reefs and shallow waters about the Hawaiian and other islands of tropical and subtropical seas will, no doubt, greatly increase the number of known species of the group and throw added light on the problem of distribution.

One of the interesting disclosures resulting from a study of the collection of Squillidae in the Bishop Museum is the fact of the occurrence in the Hawaiian waters of *Odontodactylus hansenii* (Pocock), previously reported from the China Sea, and *Squilla alba* Bigelow, known only heretofore as from the Bahamas. More complete knowledge of the Stomatopoda will, no doubt, reveal a much more extensive distribution of many of the species previously believed to be somewhat restricted in their dispersal. The long life of the larvae, together with favorable ocean currents, may possibly explain the presence of the same species in widely separated regions, especially in the same ocean. It is only reasonable, however, to believe that more complete surveys would reveal the species in intervening localities and thereby shorten the links of the distributional chain.

Attention is here called to the structural difference between the male accessory organ of *Lysiosquilla maculata* (Fabricius) in specimens from Tahiti as compared with that in the specimens from Hawaii. A large number of Hawaiian specimens, however, should be examined before conclusions regarding a fixed local variety can be drawn with certainty.

SQUILLIDAE

There are, at the present time, six recognized genera of the Squillidae, all of which are represented in the Bishop Museum collection by one or more species.

The following key, presenting the distinguishing characteristics of the genera, is one formulated by Kemp[5].

I. Articulation between merus and ischium of raptorial claw terminal (normal); merus grooved inferiorly for reception of propodus throughout its length; propodus finely pectinate or with a series of fixed spines along outer edge of dorsal surface; dactylus rarely inflated at base.

- A. Carapace with well-marked carinae; cervical groove defined across dorsum of carapace; first five abdominal somites with longitudinal carinae (raptorial dactylus not inflated at base)......**Squilla**, p. 287
- B. Carapace without carinae; cervical groove not extending across dorsum of carapace; first five abdominal somites without longitudinal carinae[6].
  1. Abdomen usually compressed; raptorial dactylus not inflated at base with two, rarely three, teeth on inner margin,[7] or unarmed; telson with sharp median carina and (in adults) with other carinae on either side .... **Pseudosquilla**, p. 288
  2. Abdomen depressed; raptorial dactylus not inflated at base with at least four teeth on inner margin; telson without median carina, often smooth or with a transverse circlet of spines .... **Lysiosquilla**, p. 292
  3. Abdomen depressed; raptorial dactylus with three teeth on inner margin; telson closely studded with fine spineules or large tubercles, with or without a pair of submedian carinae .... **Coronida**, p. 295

II. Ischio-meral articulation of raptorial claw situated at a point anterior to proximal end of merus, which consequently extends backward considerably beyond the joint; ventral surface of merus grooved and hollowed for reception of propodus for not more than three-quarters its length; dactylus inflated at base.

- A. Dactylus of raptorial claw with teeth on its inner margin.. **Odontodactylus**, p. 297
- B. Dactylus of raptorial claw without teeth on its inner margin.. **Gonodactylus**, p. 299

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[5] Kemp, S., Crustacea Stomatopoda of the Indo-Pacific Region: Mem. Indian Mus., vol. 4, p. 16, 1913.

[6] See Kemp's exception and reference in his footnote No. 1.

[7] Kemp excludes the terminal tooth. See his footnote No. 2.

SQUILLA Fabricius

Squilla oratoria de Haan[8].

Squilla oratoria de Haan, in Siebold's Fauna Japonica, Crust., Atlas, Pl. 51, fig. 2, 1844.

Squilla affinis Berthold, Abhandl. Gess. Wiss. Göttingen, vol. 5, p. 26, 1845.—Bigelow, Proc. U. S. Nat. Mus., vol. 17, p. 538, fig. 22, 1894, and synonymy.

Squilla oratoria Kemp, Mem. Indian Mus., vol. 4, p. 66, Pl. 5, figs. 54-56, 1913, and synonymy.

In the Bishop Museum collection of Squillidae are eight specimens of this species, including two females collected at Guam by Alvin Seale in 1901, and six specimens, two males and four females, obtained by the writer from the Honolulu market during 1921.

The specimens from Guam agree in all details with those from Honolulu, and all are in accord with previously published descriptions of the species. Figure 1, *a*, represents the male accessory organ of the first abdominal appendage of a specimen from Honolulu. The color of the specimens obtained from the Honolulu market in a fresh condition was reddish-brown with the uropods marked with black patches. The dactyli were much lighter in color than the carapace and abdomen. The alcoholic specimens from Guam are uniformly light brown above.

The largest specimen in the Bishop Museum collection, a female from Honolulu, measures 165 mm. from the tip of the rostrum to the extremity of the submedian marginal spines of the telson.

The species, represented in the Bishop Museum by the specimens from Honolulu and Guam, is apparently abundant in Chinese and Japanese waters. It has also been reported from Mauritius, Ceylon, New Zealand, and the Philippine Islands.

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[8] The specific name of this species has been the basis of some controversy. I have given preference to de Haan's name instead of that of Berthold as it would seem that Stebbing's view is the correct one. See Stebbing, T. R. R., South African Crustacea: Ann. South African Mus., vol. 6, p. 45, 1908.

Squilla alba Bigelow.

Squilla alba Bigelow, Johns Hopkins Univ. Circular 106, p. 103, 1893; Proc. U. S. Nat. Mus., vol. 17, p. 539, Pl. 22, 1894.

In the collection of Squillidae in the Bishop Museum a single specimen apparently belongs to this species. In so far as the writer can determine, the species has not been reported from the Pacific previously. It was described by Bigelow from two female specimens that he took in Bimini Harbor, Bahamas.

The specimen in the Bishop Museum, also a female, was taken by the writer from dead coral on Waikiki reef, Honolulu, in 1921. In all structural details it agrees with Bigelow's diagnosis of the type specimen, but the symmetrically arranged, minute, black spots mentioned in Bigelow's general description of the species are absent from the Honolulu specimen. The specimen taken at Waikiki was kept alive and under observation by the writer for more than a month, during which period no spots were observed on the carapace or abdomen.

Bigelow says of these markings, "The same number of spots is not always present." It seems apparent from the Honolulu specimen that the spots are not a constant feature of the species.

The color of the Bishop Museum specimen is pure white. The eyes are of a yellowish tint with darker pigment in the concavity of the cornea.

The specimen taken at Honolulu measures 47 mm. from the tip of the rostrum to the extremity of the submedian marginal spines of the telson. This specimen is slightly larger than those in the U. S. National Museum.

The Bishop Museum specimen was taken on Waikiki reef, Honolulu. The type locality is Bimini Harbor, Bahamas, where the specimens in the U. S. National Museum were obtained.

PSEUDOSQUILLA Dana

Pseudosquilla ciliata Miers.

Pseudosquilla ciliata Miers, Ann. and Mag. Nat. Hist., ser. 5, vol. 5, p. 108, Pl. 3, figs. 7, 8, 1880.—Brooks, Voyage of the "Challenger," Zool., vol. 16, Stomatopoda, p. 53, Pl. 15, fig. 10, 1886.—Bigelow, Proc. U. S. Nat. Mus., vol. 17, p. 499, 1894.—Hansen, Engeb. Plank. Exp., II, G. c. p. 86, 1895.—Rankin, Ann. N. Y. Acad. Sci., 12, p. 253, 1898.—Bigelow, Bull. U. S. Fish Comm., vol. 2, p. 154, fig. 4, 1900.—Kemp, Mem. Indian Mus., vol. 4, p. 96, 1913.

The collection of Squillidae in the Bishop Museum consists of twenty-one specimens of this well-known and widely distributed species. Of this number seven, three males and four females, were taken by Alvin Seale at Guam in 1900, one, a male from the Marquesas by the same collector in 1902, five, three females and two males, from the reef near Koko Head, Oahu, by the writer in 1920, and four, two males and two females, from the reef at Waikiki, Honolulu, by J. M. Ostergaard and the writer in 1921. Four other specimens, two males and two females, included in the collection are without data but probably are Hawaiian.

The specimens are, in most details, quite typical. The basal prolongation of the uropod in the specimens from Guam, the Marquesas, and Oahu extends slightly beyond the tip of the endopodite but does not reach the distal extremity of the exopodite, as is indicated in the description of the type specimen by Miers.

All the Bishop Museum specimens agree with the description by Brooks of a specimen from Honolulu, in having the inner spine of the prolongation of the uropod longer than the outer. Brooks states, however, that in the Honolulu specimen the distal segment of the exopodite of the uropod is about as long as the proximal segment. But none of the Pacific forms in the Bishop Museum agree with his description in this feature, the distal segment of the exopodite being slightly less than five-eighths as long as the proximal one. In this respect the specimens correspond more closely with those taken in the region of Porto Rico, according to Bigelow's description.[9]

The presence of postero-lateral spines on the fourth abdominal segment is apparently a variable characteristic of the species even in the same locality. Two of the nine specimens from Oahu show such spines, as do two of the seven specimens from Guam. All bear postero-lateral spines on the fifth abdominal segment.

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[9] Bigelow, R. P., The Stomatopoda of Porto Rico: Bull. U. S. Fish Comm., vol. 20, p. 155, 1900.

The color of the specimens from Guam, preserved in alcohol, varies from greenish-black to light brown. Some of them show distinct mottled yellow and white patches on the exposed thoracic and abdominal segments. The dactylus of the raptorial limb is marked by a series of dark spots giving it the appearance of being banded. In the specimens from Oahu, preserved in alcohol, the dactylus has a faint rose color, more intensified near the distal extremity. These latter specimens are of a grayish color above, one of them strongly mottled by dark pigment, the others to a lesser degree. Black patches on the sides of the fifth and sixth thoracic segments and the first abdominal segment, as well as on the lateral margins of the first five abdominal segments, seem to be characteristic of the specimens from Oahu. These black patches on the lateral surfaces of the segments mentioned above are faintly visible in some of the specimens from Guam.

The largest specimen in the Bishop Museum collection, a female from the reef near Koko Head, Oahu, measures 81 mm. from the tip of the rostrum to the extremity of the submedian marginal spines of the telson. The largest specimen from Guam, also a female, measures 60 mm. in length.

The Bishop Museum specimens are from Guam, the Marquesas, and Hawaii.

This species is one of the most widely distributed of the known Squillidae. It ranges from Mauritius to the Red Sea, Malay Archipelago, Japan, through the South Seas to Hawaii. It has also been taken from the Florida Keys, Bermuda, the Bahamas, and at numerous localities about Porto Rico.

Pseudosquilla oculata (Brullé).

> *Squilla oculata* Brullé, in Webb and Berthelot, Isles Canaries, Zoology, Crust., p. 18, 1836-1844.
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> *Pseudosquilla oculata* Miers, Ann. and Mag. Nat. Hist., ser. 5, vol. 5, p. 110, 1880.—Bigelow, Proc. U. S. Nat. Mus., vol. 17, p. 500, 1894.—Borradaile, Trans. Linn. Soc. London, vol. 12, p. 214, 1907.—Kemp, Mem. Indian Mus., vol. 4, p. 102, 1913.

This species may be distinguished from the more common *Pseudosquilla ciliata* in having club-shaped eyes, a small median spine on the rostrum, and in the presence of eight carinae besides the median ridge on the telson.

Miers also indicates the truncated lateral margins of the second and third exposed thoracic segments, and the presence of a distinct circular spot, green in color, bordered by a pale margin, on each side of the carapace, as specific characteristics distinguishing both this species and *Pseudosquilla ornata* Miers from *Pseudosquilla ciliata.*

Of the eleven specimens of this species in the Bishop Museum, six, four males and two females, were taken from Waikiki reef, Honolulu, during 1920 and 1921. One specimen, a female, was taken in Kahana Bay, Oahu, in 1921. Four other specimens, one male and three females, although without data are probably from Waikiki reef.

Figure 1 represents the male accessory organ of the first abdominal appendage of this species. On comparing this with the male accessory organ of *Pseudosquilla ciliata,* as figured by Brooks, the similarity of these structures in closely allied species is obvious.

The color of the living specimens obtained on Waikiki reef in August, 1921, was dark green above, with a narrow line of pink color on the posterior border of the exposed thoracic and first five abdominal segments. The fringe of the uropods, antennal paddles, and swimmerets was deep pink. In the largest specimen the right raptorial limb was bright pink in color while the left was green with only a faint indication of pink on the dactylus. The deep green spots on the carapace were very evident in the living specimens. The alcoholic specimens in the collection have, without doubt, lost their natural color. They are light brown, a few of them nearly white except the eyes, which have remained dark brown.

The largest specimen in the Bishop Museum collection, a female, is 55 mm. in length from the tip of the rostral spine to the extremity of the submedian marginal spines of the telson. A specimen in the British Museum is reported by Miers to be 3¼ inches in length.

The eleven specimens in the collection of the Bishop Museum are all from Oahu.

The species has been previously reported from the Canaries, Madeira, Cape Verde Islands, Mauritius, Chagos, Samoa, and the China Sea.

LYSIOSQUILLA Dana

Lysiosquilla maculata (Fabricius).

Squilla maculata Fabricius, Ent. Syst., vol. 2, p. 511, 1796.

Cancer (Mantis) arenarias Herbst, Nat. Krabben u. Krebse, vol. 2, p. 96, 1796.

Lysiosquilla maculata Miers, Proc. Zool. Soc. London, p. 158, 1877; Ann. and Mag. Nat. Hist., ser. 5, vol. 5, p. 5, 1880.—Brooks, Voyage of the "Challenger," vol. 16, Stomatopoda, p. 45, Pl. 10, figs. 1-7, 1886.—Bigelow, Proc. U. S. Nat. Mus., vol. 17, p. 508, 1894.—Kemp, Mem. Indian Mus., vol. 4, p. 111, 1913.

Five specimens of this species are in the collection of the Bishop Museum. Four of these, two males and two females, were taken by Alvin Seale at Tahiti in 1901, the other, a male, was obtained by J. W. Thompson from the Honolulu market in 1917. Unfortunately the dactyli of this latter specimen have been removed.

All of these specimens are apparently typical, agreeing in structural details with descriptions previously published. Of those from Tahiti, the largest one, a female, has nine lateral teeth on the dactylus of the raptorial limb, including the terminal one, while each of the other specimens from that locality bears ten teeth on the dactylus.

The matter of sexual dimorphism, mentioned by Miers, Brooks, Bigelow, and others, is very evident in these specimens, the lateral teeth of the dactyli of the males being longer and stouter than those of the females.

Brooks describes and figures[10] the accessory organs of the first abdominal appendage of the male of this species. In order to present in more complete detail the general features of this structure, and to point out some differences between the Tahiti and the Honolulu specimens with respect to this organ, figures of the endopodites bearing the accessory organs of individuals from each locality are introduced, figure 1, *c*, representing a male from Tahiti, and figure 1, *d*, a male from Honolulu.

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[10] Brooks, W. K., Report on the Stomatopoda: Voy. H.M.S. "Challenger," Zoology vol. 16, Pl. 10, 1886.

It will be observed that the retinaculum (*rm*) in each specimen is prominent but less angular in the Tahiti specimen. In each case the movable limb of the forceps (*ml*) is slightly curved and well developed, while the fixed limb (*fl*) is much smaller and terminates in a distinct hook. In the Tahiti specimens a prominent ridge continues from the base of the movable limb of the forceps diagonally to a point just distal of the hook of the fixed limb then bends abruptly fusing with the small inner lobe of the endopodite. In the Honolulu specimen this ridge is only slightly developed and lacks the angular character. This difference is not one of maturity as the Honolulu specimen is the larger, being 24.7 cm. in length. In each specimen a thin, fleshy ridge extends diagonally across the small, inner lobe of the endopodite. This ridge (unlabeled in the figures) is more prominent in the examples from Tahiti.

The careful examination of a larger series of perfect specimens of this species from different regions would probably result in the determination of distinct local varieties.

The color of the Honolulu specimen, preserved in alcohol, is much lighter in color than that of the Tahitian specimens. The ground color of the dorsal surface of the former is pale yellow with three bands of dark pigment extending transversely across the carapace, and similar bands at the sutures of the segments of the hind body. Large black spots mark the uropods. A dark Y-shaped patch, having a large, black spot on either side of it, occupies the posterior half of the medial region of the telson with a large, black spot on either side of it. A broad, pale-yellow stripe marks the hind body in the mid-dorsal line as far as the sixth abdominal segment. The terminal segments of the raptorial limbs are marked with broad spots of dark brown.

The specimens from Tahiti, which have been preserved in formaldehyde for some time, are, in general, marked like the

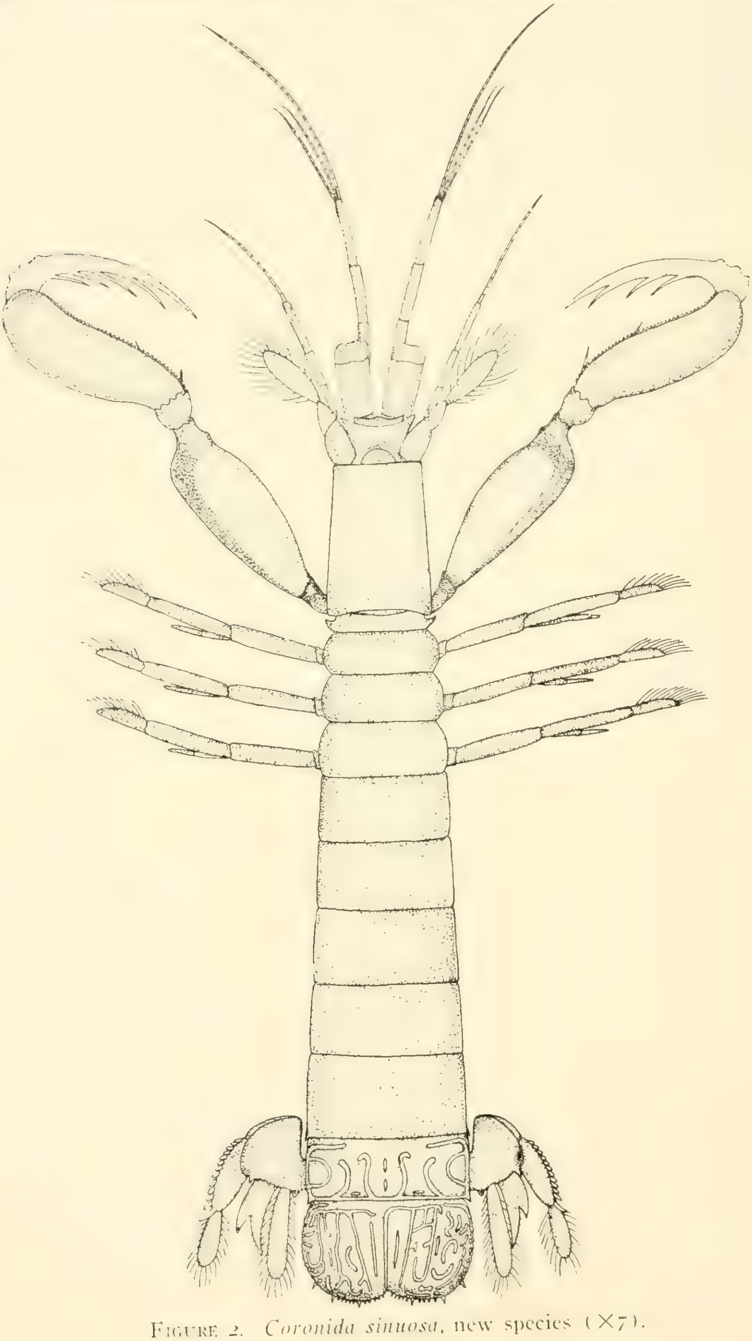

FIGURE 2. *Coronida sinuosa*, new species (×7).

one from Honolulu but are very much darker in color. A crescent-shaped, black patch on either side of the median ridge of the telson is distinct in these specimens.

The largest specimen in the Bishop Museum collection, a male from Honolulu, measures 247 mm. from the tip of the rostral spine to the posterior border of the telson. The largest of the four specimens from Tahiti, a female, is 218 mm. in length.

The Bishop Museum collection includes specimens from Tahiti and Honolulu.

The species is widely distributed throughout the Indo-Pacific region from Japan to South Africa. It is apparently confined to shallow water where it burrows in the sand.

CORONIDA Brooks [11]

Coronida sinuosa new species. Figure 2.

A minute form, evidently a new species, taken from Waikiki reef, Honolulu, has been referred to this genus. The specific characteristics are as follows:

Eyes narrow, elongated and flattened; rostrum short, smooth, and evenly rounded; antennular somite elongated[12]; dactylus of raptorial limb with three or four curved teeth on the inner margin and three blunt teeth on the outer surface near the proximal extremity; carapace smooth with corners rounded; posterior border of carapace concave; fifth thoracic segment with lateral process acute and curved anteriorly; lateral margins of sixth, seventh, and eighth thoracic segments narrowed but evenly rounded; exposed thoracic segments and the first five abdominal segments without carinae; lateral margins of first five abdominal segments rounded anteriorly and posteriorly; postero-lateral margins of the fifth and sixth abdominal segments produced into short, sharp spines; dorsal surface of sixth abdominal segment ornamented by a series of sinuose, scroll-like carinae, nearly symmetrical in arrangement; dorsal surface of telson marked by numerous linear, curved, and scroll-like carinae which lack symmetry on the two sides except in the medial region where it is maintained in a slight degree; posterior border of telson notched; telson with six short marginal spines, the submedian pair having movable tips; eight or ten denticles between the submedian spines and four or five between each submedian and intermediate spine.

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[11] Op. cit., p. 79.—Kemp, Crustacea Stomatopoda of the Indo-Pacific region: Indian Mus. Mem., vol. 4, pp. 129-130, 1913.

[12] This feature may represent a postlarval condition. See Kemp, op. cit., p. 93.

This small species, of which there is a single specimen in the collection of the Bishop Museum, was taken by the writer from among dead coral on Waikiki reef, Honolulu, in 1921.

It is apparently somewhat closely allied to *Squilla multituberculata* of Borradaile,[13] but differs from that species in the form of the rostrum, and in the ornamentation of the sixth and seventh abdominal segments.

The species under consideration may easily be recognized by the ornamentation of the sixth and seventh segments of the abdomen. The sinuose character of the carinae has suggested the specific name by which this species may be designated.

On the sixth abdominal segment the carinae may be recognized as median, submedian, intermediate, lateral, and marginal, all of which, except the median, unite with a transverse carina extending along the posterior border of the segment. The medial carina is broken into two sections and does not reach the transverse carina mentioned above. The submedian and intermediate carinae of this segment are curved and the lateral with the marginal enclose an oval area on either side. A short, blunt elevation is located on either side near the posterior border between the submedian and intermediate carinae. By referring to figure 2, it will be observed that there is an approach to symmetry in the arrangement of the carinae on the right and left sides of the sixth segment.

The telson is also ornamented by numerous carinae, a few of which are straight while others are sinuose and scroll-like. In addition to these, blunt tubercles are interspersed with the carinae especially near the posterior border. There is a linear, median carina and immediately on either side there is some appearance of symmetrical arrangement among the carinae, but it is not maintained on the remaining surface of the telson.

Each uropod consists of a large subtriangular basal segment which has a lateral and a medial tooth produced from the posterior border. The distal segment of the expodite is elongated,

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[13] Borradaile, L. A., On some crustaceans from the South Pacific. Part 1, Stomatopoda: Proc. Zool. Soc. London, No. 3, p. 38, Pl. 6, figs. 7, 7 *a-c*, 1898.

narrow, almost equaling in length the proximal segment which bears eleven cylindrical spinules on its lateral border, the terminal one of which is large and curved outward. The distal segment of the endopodite is long and narrow. Two spinous processes terminate the basal prolongation of the uropod, the inner one of which is much the longer and reaches slightly beyond the middle of the terminal segment of the endopodite.

In this specimen lack of symmetry is seen not only in the carinae of the telson but also in the dactyli of the raptorial limbs. On the left dactylus there are four teeth on the inner border, besides the terminal one; on the right dactylus there are but three teeth. The terminal one of the three teeth on the outer border of the dactylus is bifid when observed from a proximal or distal point of view.

In life the color of the animal is uniformly white with the corneal area of the eye black. The specimen, preserved in alcohol, is yellowish-white with no change of color in the corneal region of the eye.

The total length from tip of the rostrum to the extremity of the submedian spines of the telson is 17 mm. Length of carapace, including rostrum, 3 mm.; of exposed thoracic and first five abdominal segments, 11½ mm.; of sixth abdominal segment and telson, 2½ mm.

There is no certainty that the individual described is mature. It was kept under observation for more than a month during which time it moulted once. No appreciable increase in size was observed during this period.

Type locality, Waikiki reef, Honolulu, among dead coral. Sex, female. Type specimen in Bishop Museum (Catalogue No. 526).

ODONTODACTYLUS Bigelow

Odontodactylus hansenii (Pocock).

Gonodactylus hansenii Pocock, Ann. and Mag. Nat. Hist., ser. 6, vol. 11, No. 66, p. 477, Pl. 20, B., June, 1893.

Odontodactylus hansenii Bigelow, Proc. U. S. Nat. Mus., vol. 17, p. 496, 1894.—Kemp, Mem. Indian Mus., vol. 4, p. 140, 1913.

In 1894 Bigelow formed a new genus[14] to include a number of species previously described under the generic term Gonodactylus and having the dactylus of the raptorial limb dilated at the base and provided with lateral teeth. *Gonodactylus hansenii*, described by Pocock, is such a species.

There are in the collection of the Bishop Museum three specimens, one male and two female, which correspond closely with Pocock's description of the type specimen and apparently belong to this species. In Pocock's description it is said that the sixth abdominal tergite and telson resemble the corresponding segments in *Odontodactylus scyllarus* (Linnaeus). In the description of the latter species, Miers[15] mentions the sixth abdominal segment as having eight ridges which usually terminate in spinelets, with two smaller prominences near the base. In the specimens in the Bishop Museum but six of the carinae of the sixth abdominal segment terminate in spines, and Pocock's figure seems to indicate a similar condition.

Figure 1, *c*, is a drawing of the male accessory organ of the first abdominal appendage of the same species. Figure 1, *f*, represents the details of the sixth abdominal segment and the telson of a Bishop Museum specimen.

The color of the Bishop Museum specimens, preserved in alcohol, is uniformly light-yellowish above with a light-pink posterior margin on each of the exposed thoracic and first four abdominal segments. There is a dark-brown patch on the basal half of each uropod. The eyes are dark brown and the flagella of the antenna are pink.

Pocock refers to the color of the type specimen as yellowish-pink.

The largest specimen in the Bishop Museum collection, a female, measures 43 mm. from the tip of the rostrum to the extremity of the submedian marginal spines of the telson. According to Pocock the type specimen measures 60 mm.

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[14] Bigelow, R. P., Report on the Stomatopoda in the U. S. Nat. Museum: Proc. U. S. Nat. Mus., vol. 17, p. 495, 1894.

[15] Miers, E. J., On the Squillidae: Ann. and Mag. Nat. Hist., ser. 5, vol. 5, p. 115, 1880.

The Bishop Museum specimens were dredged off Waikiki, Honolulu, by D. Kuhns, at depths ranging from 30 to 50 fathoms.

Pocock records the species from Macclesfield Bank, China Sea, at 35 fathoms.

GONODACTYLUS Latreille

Gonodactylus guerinii White.

Gonodactylus guerinii White, Proc. Zool. Soc. London, 1861, p. 43, Pl. 7; Ann. and Mag. Nat. Hist., vol. 7, p. 476, 1861.—Miers, Ann. and Mag. Nat. Hist., ser. 5, vol. 5, p. 121, 1880.

Prostosquilla guerinii Brooks, Voyage of the "Challenger," Zool. vol. 16, Stomatopoda, p. 75, Pl. 16, figs. 1 and 6, 1886.

Gonodactylus guerinii Kemp, Mem. Indian Mus., vol. 4, p. 192, 1913.

This species was first described in 1861 under the genus Gonodactylus by Adam White of the British Museum from a specimen taken at Matuka, Fiji Islands. In 1880 E. J. Miers, also of the British Museum, in a descriptive list of the known Squillidae described the same specimen.

W. K. Brooks in 1886 established the genus Protosquilla and published a detailed description of this species, including it under the new generic term. The specimen described by Brooks was taken by the "Challenger" at Honolulu.

More recent investigators,[16] however, are of the opinion that the genus Protosquilla formed by Brooks is unsound and, therefore, have again referred the species to the original genus Gonodactylus.

The two specimens mentioned above are the only ones of this species previously reported. Descriptions by White, Miers, and Brooks are sufficiently explicit in most of the details of this remarkable species. Figures supplement the technical descriptions of White and Brooks.

There is a single specimen of this species, a male, in the Bishop Museum collection. It is a typical example of the species, agreeing in all essential features with previously published descriptions.

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[16] Kemp, S., The Crustacea Stomatopoda of the Indo-Pacific region: Mem. Indian Mus., vol. 4, p. 145, 1913.

The "Challenger" specimen was a female. Miers states that the dried specimen in the British Museum is a female. The Bishop Museum specimen is a male.

Figure 1, g, represents the endopodite of the first abdominal appendage of a male *Gonodactylus guerinii*, the explanation of which will make plain the main features of the accessory organ in this species. There will be seen, in addition to the parts of the accessory organ mentioned in the introduction, a slightly elevated ridge extending across the endopodite between the fixed and movable limbs of the forceps and approximately as long as the latter. In this species the hooked fixed limb of the forceps is very much shorter than the movable one.

The color of the Bishop Museum specimen, after having been preserved in alcohol for five years, is pale brown above with the fifth, sixth, and seventh abdominal segments, the antennae, attennules, and the raptorial limbs very much lighter in color.

Both White and Miers mention the marbled color of the dried specimen, and Miers adds that it is "light yellowish brown varied with darker colour." According to Brooks the "Challenger" specimen, in alcohol, is marked with brown pigment, the carapace having a broad, transverse, light band across it.

The size of the specimen in the Bishop Museum collection is 40 mm. from the tip of the rostrum to the extremity of the telson, not including the marginal spines of the latter. The length of the British Museum specimen, as given by White and Miers, is 2½ inches. The "Challenger" specimen, according to Brooks, is 1.12 inches, from the tip of the rostrum to the distal extremity of the telson.

The Bishop Museum specimen was taken off Waikiki, Honolulu, at a depth of 50 fathoms, by D. Kuhns during January, 1916. The British Museum specimen was taken at Matuka, Fiji Islands. The "Challenger" specimen was collected at Honolulu.

Gonodactylus chiragra (Fabricius), var. **acutus** Lanchester.

Gonodactylus chiragra (Fabricius), var. *acutus* Lanchester, Fauna and Geography of Maldive and Laccadive Archipelagoes, vol. 1, p. 444, Pl. 23, 1903.

For a very complete discussion of this widely distributed species and its varieties the above reference may be consulted. Attention is also called to Kemp's treatment of this species.[17]

Lanchester recognizes numerous varieties including those considered as distinct by previous investigators and points out the presence of intermediate forms that obliterate the structural distinctions heretofore regarded as specific.

Two female specimens are in the collection of the Bishop Museum, both of which may be assigned to the above variety.

The specimen from Guam corresponds in all details of the telson with Lanchester's var. *acutus.* The three carinae of the telson are sharply defined, the median one descending abruptly at its distal extremity. No appearance of lateral marginal teeth is evident. The specimen from the Marquesas may be considered an intermediate form between var. *tumidus* Lanchester and var. *acutus,* although it more closely approaches the latter. As to the carinae of the telson it closely resembles the latter variety, but traces of lateral marginal teeth are to be observed in the Marquesan specimen.

The color of the Bishop Museum specimen from Guam, preserved in alcohol, is yellowish in color with faint evidence of greenish mottlings. The lateral borders of the carapace, the posterior margins of the exposed thoracic and the abdominal segments as well as the summits of the carinae are green. The posterior edge of the sixth abdominal segment on the ventral surface is distinctly marked by the same color. The dactylus of the raptorial limb is greenish-white. A pink band marks the outer surface of the manus near its distal extremity. The alcoholic specimen from the Marquesas is greenish-brown above, with the sixth abdominal segment and the telson considerably lighter in color. The raptorial limbs are almost white. Lanchester's specimen is recorded as "variegated green and white."

The largest of the Bishop Museum specimens, the one from Guam, measures 80 mm. from the tip of the medial rostral spine to the extremity of the submedian marginal spines of the telson. Lanchester's largest specimen is recorded as being 62.5 mm. in length.

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[17] Kemp, S., The Crustacea Stomatopoda of the Indo-Pacific Region: Mem. Indian Mus., vol. 4, p. 150, 1913.

The Bishop Museum specimens were taken by Alvin Seale, one at Guam in 1900 and the other at the Marquesas in 1902. Lanchester records the variety from the reef of Minikoi.

PUBLICATIONS RELATING TO THE STOMATOPODA

A brief list of some of the more important publications that every investigator of the Stomatopoda should consult is given below. Several of the reports include very complete bibliographies up to the date of publication. The report by Bigelow lists all of the more valuable publications on the Squillidae up to 1894, and Kemp's comprehensive work (1913), by reason of the very complete bibliography which it includes, is of special assistance to the student of this group.

The list includes a few papers published since 1913 that contain subject matter on the Stomatopoda.

Miers, E. J., On the Squillidae: Ann. and Mag. Nat. Hist., ser. 5, vol. 5, pp. 2-30 and 108-127, 1880.
(Descriptions of known species up to 1880.)

Brooks, W. K., Report on the Stomatopoda collected by H.M.S. "Challenger" during the years 1873-76: Report of the scientific results of the voyage of the "Challenger," Zoology, vol. 16, 1886.

Bigelow, R. P., Report upon the Crustacea of the order Stomatopoda collected by the steamer "Albatross" between 1885 and 1891, and on other specimens in the U. S. National Museum: Proc. U. S. Nat. Mus., vol. 17, pp. 489-550, 1894.
(A consideration of American species with a bibliography up to 1894.)

Giesbrecht, W., Stomatopoden: Fauna u. Flora d. Golfes von Neapel, Mon. 33, pp. 25, 34, 40, 44, 131, Pls. 1-6, 1910.
(A monograph of Mediterranean species.)

Kemp, S., Crustacea Stomatopoda of the Indo-Pacific region: Mem. Indian Mus., vol. 4, pp. 1-214, Pls. 1-10, 1913.
(Includes a very complete bibliography on Stomatopoda up to 1913.)

Rathbun, Mary J., Stalk-eyed Crustaceans collected at the Monte Bello Islands: Proc. Zool. Soc. London, vol. 2, pp. 653-664, Pls. 1, 2, 1914.

Kemp, S., On a collection of Stomatopoda Crustacea from the Philippine Islands: Phil. Jour. Sci. D, vol. 10, pp. 169-187, Pl. 1, 1915.

Kemp, S., Fauna of the Chilka Lake, Stomatopoda: Mem. Indian Mus., vol. 5, pp. 193-197, figs. 1, 2, 1915.

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The Dermaptera and Orthoptera of Hawaii

By Morgan Hebard

INTRODUCTION

The acquisition of a collection of Dermaptera and Orthoptera from Hawaii first directed our attention to the literature of that region bearing on these orders. It was found that the earlier literature comprised a paper by Bormans in 1882, one by Brunner in 1895, and a number of scattered records and descriptions of new species by various other authors. In 1899 Perkins published in the Fauna Hawaiiensis a much more complete paper on the Dermaptera and Orthoptera of Hawaii than had previously been possible, and in 1910 he published a supplement in the same series. Subsequent to Perkins's work, Swezey had published detailed and highly commendable papers on several species found in Hawaii, and since 1905 frequent records and notes have appeared in the Proceedings of the Hawaiian Entomological Society.

It is unfortunate that many of the species, particularly among the adventive forms, were originally very casually identified. On this account a considerable number of species incorrectly appear in the literature as occurring in Hawaii, the records being based on species that are similar in certain features, but almost all very readily distinguishable when compared with material of the forms they were supposed to represent. In compiling the previous records, Perkins was unable to make the necessary comparisons; as a result his work included a large proportion of the earlier errors.

This situation gradually became clear to us, and we immediately began to make efforts to examine material of as large a number of the Hawaiian species as possible. In this work the material in the United States National Museum loaned by Mr. A. N. Caudell was of much service, but the prompt and extensive assistance furnished by that active and thorough worker, Mr. O. H. Swezey, was invaluable. Largely through the aid of Mr. Swezey we have now been able to examine material representing all of the very doubtful forms recorded, excepting *Oniscosoma pallida* Brunner and *Conocephaloides hawaiiensis* Perkins, material of these species being at present lacking in the Hawaiian collections. Mr. Swezey has sent us for study a rich series from the collections of the Experiment Station of the Hawaiian Sugar Planters' Association, the Territorial Board of Agriculture, the Bernice P. Bishop Museum, and from the private collection of Mr. P. H. Timberlake. The total probably represents a larger collection than had previously been reported on, and we take the present opportunity to describe the new species included and make the numerous corrections necessary to place the nomenclature on a more secure basis.

We take great pleasure in expressing our hearty thanks to Mr. O. H. Swezey for his exceptionally valuable aid, and also to Dr. C. M. Cooke, who has saved us many weary hours of search in locating the numerous localities recorded in the following pages.

The conclusions in the present study are based on a comparison of the material from Hawaii with that in the collections of the Philadelphia Academy of Sciences, where are represented most of the species with which Hawaiian forms have been confused.

Much remains to be done, we believe, in determining the actual number of forms native in Hawaii, their geographic, racial, or full specific significance and their geographic distribution. In some species there are also striking, though less important, variants that can be satisfactorily understood only after much collecting has been done, with careful observation as to the effect of local environmental conditions, of soil, humidity, and vegetation.

A total of six hundred and eighty-eight specimens has been examined, representing forty of the forty-one genera and all but two of the adventive species that have been recorded from Hawaii. A large proportion of the native species have undoubtedly been represented, but the questionable validity of a number of described forms gives rise to doubt as to the actual number of species indigenous to the islands of Hawaii.

The Hawaiian Dermaptera and Orthoptera are grouped as follows:

	Specimens examined	Genera	Species	Native species	Adventive
Dermaptera	171	8	12	6*	6
Orthoptera					
Blattidae	95	15	16	2†	13
Mantidae	2	2	2	0	2
Phasmidae	0	0	0	0	0
Acrididae	18	2	2	0	2
Tettigoniidae	48	5	13	10‡	3
Gryllidae	354	9	30§	24§	6

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* All ? ; † Both ? ; ‡ One ? ; § Or more

DERMAPTERA

Eleven species of earwigs are discussed below and three other female specimens that were examined from the island of Hawaii represent one or two additional but at present not determinable Hawaiian species of the genus Anisolabis. These in the opinion of the writer represent all the species of this order that have been taken in all Hawaii.

Of these species, five are unquestionably adventive, while several more are probably so. Four are as yet known only from the Territory of Hawaii, but all of them may have a distribution roughly parallel to that of the three species that are known to be represented as well on islands in the south Pacific.

LABIDURIDAE

Psalinae

ANISOLABIS Fieber

Three Hawaiian species have been referred to the genus Anisolabis Fieber. One of these, *annulipes* (Lucas), has been placed by Burr in the genus Euborellia, a genus based on male genitalic features alone. It is possible that monographic study of this very large group will afford additional evidence, warranting the separation of these genera and, consequently, we are in favor of recognizing Euborellia for the present. Unfortunately the male genitalia have not been studied for the other species here recorded; it would therefore appear advisable to refer them to Anisolabis until that work has been done.

All of these species are subject to variation, the least decided being in *eteronoma* Borelli, and it is almost certain that the records from Hawaii of *maritima, littorea,* and *pacifica* and the description of *aporonoma* are entirely based on material of the species here discussed. It seems therefore that those names have no valid standing in the Hawaiian list.

Many of the species have a wide distribution and are readily introduced by commerce into favorable regions. Thus, judging from the known distribution of *annulipes,* it seems probable that the species has been introduced in Hawaii. Further knowledge of the Asiatic, Austro-Malayan, and Papuan faunas is needed before the probable origin of the other species can be determined. At the present time, *eteronoma* and *perkinsi* are known only from Hawaiian material.[1]

Anisolabis eteronoma Borelli

1909. *Anisolabis eteronoma* Borelli, Boll. Lab. Zool. Scuola Agr. Portici, III, p. 315. [♂, ♀; Hilo, Hawaii.]
1882. *Anisolabis littorea* Bormans (not *Forficula littorea* White, 1874), Ann. Mus. Civ. Stor. Nat. Genova, XVIII, p. 339. [Oahu; Haleakala, Maui.[2]]

Hilo, Hawaii, VII, 1918, (U. S. Inspector), 1 ♂, [Hebard Coll.].
Kohala, Hawaii, V, 20, 1917, (O. H. Swezey), 1 ♀, [Hebard Coll.].
Mount Tantalus, Oahu, (O. H. Swezey), 1 ♀, [H. S. P. A.]; I, 5, 1919, (J. A. Kusche), 1 ♂, [Bishop Mus.]; V, 26, 1919, (J. A. Kusche), 1 ♀, [Hebard Coll.].
Pauoa Ridge, Oahu, V, 29, 1919, (J. A. Kusche), 1 ♀, [Hebard Coll.].

Bormans found that the Hawaiian material he had recorded agreed absolutely with the description of *littorea* except in size. By comparing his description and measurements with the material in hand, with the description and figure given by White and with a pair of *littorea* from New Zealand, kindly loaned to us by the Paris Museum, the Hawaiian insects are seen to be not only smaller than *littorea* but to differ further in the proportionately longer forceps, annulate antennae and male forceps which lack an abrupt proximo-internal flange. There does not appear to be the slightest possibility that these two forms represent variants or races of the same species.

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[1] Three specimens, in addition to those recorded, are before us, showing the presence in Hawaii of at least one more species belonging to the genus. It is possible that these specimens represent one or two undescribed species, but without more material representing both sexes, further comment on them seems inadvisable.

[2] These records have subsequently been published by Brunner and Perkins.

Compared with *A. maritima* (Géné), the present species may be readily separated by the darker and annulate antennae, with joints heavier; pronotum which does not widen caudad; more highly polished dorsal surface, due to the less numerous microscopic hairs; ultimate tergite with a more pronounced ventrolateral keel; preceding tergite of male similarly produced, but with minute, scattered, impressed punctae and a moderate keel, not ruguloso-striate, and heavier and proportionately shorter forceps, which, in the male, differ decidedly in being much less strongly curved and of the same type developed in *E. annulipes* (Lucas).

Compared with *annulipes,* the insect is easily distinguished by its much larger size, less globular antennal joints, immaculate limbs and numerous other features. It is evident that Burr was in error in believing *eteronoma* to be a synonym of *annulipes.*[3]

Length of body,[4] ♂ 15.3-17, ♀ 15-16.4; length of forceps ♂ 4.1-4.2, ♀ 4-4.8 mm.

Anisolabis perkinsi Burr (Plate xxvi, 1 and 2.)

1910. *Anisolabis perkinsi* Burr, Trans. Ent. Soc. London, 1910, p. 178. ♂, ♀; Kaholuamanu (nec Koholuamano) and Waimea, Kauai (nec Kaui).]

1910. [*Anisolabis*] *xenia* Burr, (not of Kirby, 1891), Proc. U. S. Nat. Mus., XXXVIII, p. 448. [♂: [Kaumana], Hawaii; [Mount] Tantalus (nec Tantalas), [Oahu].[5]]

Kaumana, Hawaii, 1500 feet, 1900, (H. W. Henshaw), 1 ♂, [U. S. N. M.].

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[3] It is regrettable that in many places Burr has indicated synonymy, apparently in haste, without justification, for examination of our material shows that, as in the present case, distinct species had actually been described.

[4] Exclusive of the forceps, as is customary.

[5] It is evident that Burr's paper on the National Museum collection of Dermaptera was hurriedly prepared, for many of his identifications, as already noted, are incorrect.

Oahu, (A. Koebele), 1 ♂, [Terr. Bd. Agr.].
Waimea Mountains, Oahu, III, 13, 1910, (O. H. Swezey), 1 ♂, [Hebard Coll.].
Kauai, 2000 to 4000 feet, II and III, 1919, (J. A. Kusche), 3 ♂, 7 ♀; 4000 feet, IV, 4, 1919, (J. A. Kusche), 1 ♂; 3000 feet, IV, 11, 1919, (J. A. Kusche), 1 ♀ [Hebard Coll.].
Kokee, Kauai, II, 1919, (J. A. Kusche), 1 ♀, [Bishop Mus.].
Maui, 2000 feet, III, 19, 1919, (J. A. Kusche), 1 ♀, [Hebard Coll.].

The species is apparently very plastic and may, indeed, divide into several insular races. Additional material is, however, required before nominal recognition of any of the forms would be justifiable.

The males before us, with four exceptions, represent the type shown in Plate XXVI, 1. These have the lateral portions of the distal abdominal tergites irregularly and weakly rugulose, with irregular impressions. The male from the Waimea Mountains, Oahu, is similar to these except in having the broadened proximal portion of the forceps form a broad tooth on the internal margin, instead of tapering gradually distad as in the others. One Kauai male has the forceps more slender, tapering more gently than those of the others and showing a very weak curvature from base to apex. In this specimen the lateral portions of the distal abdominal tergites are very finely impresso-punctate rather than irregularly rugulose, appearing smooth except under high magnification. This is apparently the simplified type developed in the species. Such a condition is known for many species of earwigs and in many specimens gives a very different facies from the normal condition.

The male labelled simply "Oahu" and that from Kaumana, Hawaii, agree with the Kauai specimen in the smoothness of the abdominal tergites and even, weak convexity of the forceps. These appendages, however, show a broad tooth on the internal margin proximad, similar to but weaker than that of the specimen from the Waimea Mountains, Oahu, and the male from Hawaii shows a weak median thickening, as figured on Plate XXVI, 2.

In the females the forceps are elongate, tapering gently and evenly from their moderately heavy bases, and very slender in their distal half, so that decided similarity is shown to the type of forceps developed in females of the genus Labidura. The internal margin of the forceps is smooth in this sex, without a trace of tuberculation or serrulation. As stated by Burr, the more slender limbs, elongate first antennal joint and more cylindrical and less globular succeeding antennal joints are features of importance.

Previous to Burr's description the species had apparently been recorded from Hawaii as *A. pacifica* (Erichson), and Perkins evidently believed the insect to represent *A. maritima* (Géné), stating that the species was common in the mountains over the entire group of islands.

MEASUREMENTS (IN MILLIMETERS)

♂	Length of body	Length of pronotum	Caudal width of pronotum	Greatest width of abdomen	Length of forceps	Basal width of forceps
Kauai	12.8	2	2.2	3	3.7	1
Kauai	15	2.1	2.3	3.5	3.7	1.1
Kauai	15.5	2.1	2.2	3.4	3.8	1
Kauai	14	2.2	2.4	3.6	3.7	1.15
Kauai	15.3	2.2	2.4	3.5	3.8	1.2
♀						
Kauai	13	2.1	2.1	3.2	3.9	.9
Kauai	12	2.2	2.3	3.3	4.5	1.2
Kauai	13.2	2.2	2.2	3.3	4.3	1
Kauai	16	2.6	2.8	3.8	4.9	1.3
Kauai	17.5	2.8	3	4.3	5	1.4
Kauai	18.3	2.8	3	4	5.1	1.2
Maui	20*	2.7	2.8	4.1	4.8	1.2

* Abdomen pressed out.

Euborellia annulipes (Lucas)

1847. *Forficesila annulipes* Lucas, Ann. Soc. Ent. France, (2), V, p. LXXXIV. ["Jardin des Plantes, Paris"; probably introduced.]

Hawaii, 4000 feet, V, 8, 1919, (J. A. Kusche), 1 juv. ♀, [Hebard Coll.].

Hawi, Hawaii, V, 21, 1917, (O. H. Swezey), 1 ♂, [H. S. P. A.].

Niulii, Hawaii, V, 22, 1917, (O. H. Swezey), 1 ♀, [H. S. P. A.].

Mount Kaala, Oahu, 4000 feet, VI, 12, 1919, (J. A. Kusche), 1 ♂, [Hebard Coll.].

Mount Tantalus, Oahu, I, 5, 1919, (J. A. Kusche), 1 ♂, 1 ♀, 2 juv. [Bishop Mus.]; XII, 11, 1904, (O. H. Swezey), 2 ♀, [H. S. P. A.].

Hamakuapoko, Maui, VIII, 14, 1918, (O. H. Swezey), 2 ♀, [H. S. P. A.].

Kauai, 2500 to 4000 feet, III, 26 to IV, 16, 1919, (J. A. Kusche), 5 ♀, 2 nearly adult ♂, 9 nearly adult ♀, 4 smaller juv. [Hebard Coll.].

Kokee, Kauai, II, 1919 (J. A. Kusche), 7 ♂, 11 ♀, [Bishop Mus.].

We agree with Burr[6] in placing *A. aporonoma* Borelli as a synonym of *annulipes,* though the other species from the island of Hawaii that Borelli described, *A. eteronoma,* is certainly distinct.

In a few of the specimens here recorded, the cephalic portion of the pronotum is pale, ochraceous-tawny, in strong contrast with the dark brown caudal portion. A similar color variation is found in the series of Californian specimens before us.

Most of the specimens, excepting those from Kauai, have the limbs fully as annulate as is usual in North American material of the species. Those from Kauai, with a few exceptions, however, have these markings reduced to a varying but usually a decided degree, though absent in some specimens. Moreover the antennal annuli are obscure or absent in many specimens of the series—a rare condition in this species. Most specimens agree closely in limb coloration with the description of *aporonoma* and it would appear that this color variation led to the making of this synonym. In *aporonoma* the femora are immaculate yellowish, except that the caudal face of the cephalic femora shows a weak blurred suffusion of brown mesad. A large number of specimens so marked have the tibiae all lightly and inconspicuously suffused with brown proximad. This condition, though very rarely encountered, is duplicated by a few North American specimens at hand.

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[6] Trans. Ent. Soc., London, 1910, p. 175, (1910).

Two females in the series from Kokee, Kauai, are of particular interest in being fully macropterous—a very rare condition in the species.[7]

Not only is the species generally abundant in the Hawaiian islands, but it has also been recorded from the islands Palmyra and Laysan.

LABIDURINAE

Labidura riparia (Pallas)

1773, *Forficula riparia* Pallas, Reise Russ. Reichs, pt. II, p. 727. [Shores of Irtysch River, western Siberia.]

Maui, 2000 feet, III, 19, 1919, (J. A. Kusche), 1 ♂, [Hebard Coll.].

Mokapu, Oahu, VIII, 29, 1920, (O. H. Swezey), 1 ♂, [Hebard Coll.].

Kaimuki Zoo, Oahu, VIII, 1905, 1 ♂, [H. S. P. A.].

Kapahulu, Oahu, V, 15, 1907, 1 ♂, 1 ♀, [H. S. P. A.].

Manoa Valley, Oahu, IV, 2 and X, 22, 1916, 2 ♂, 2 ♀, [Timberlake Coll.].

Honolulu Plantation, II, 6, 1914, 1 juv. ♀; X, 20, 1914, 1 ♀, [H. S. P. A.].

Nuuanu Valley, Oahu, V, 8, 1914, (O. H. Swezey), 1 ♀, [H. S. P. A.].

Waipahu, Oahu, III, 28, 1919, (O. H. Swezey), 2 ♀, [H. S. P. A.].

Kauai, 3500 and 4000 feet, IV, 1 to V, 3, 1919, (J. A. Kusche), 2 ♂, 4 ♀, [Hebard Coll.].

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[7] Discussed exhaustively by Pantel, Mem. R. Acad. Cienc. y Artes Barcelona, XIV, pp. 1-160, (1917).

Most Hawaiian specimens have the wings reaching only very slightly beyond the tegmina, in one male only do the wings show no reduction whatever. The series averages dark and depauperate, the females closely similar to the smallest and darkest females in the series before us from Bermuda and Cuba.

The males have the ultimate abdominal tergite with caudal margin showing no traces of paired projections between the forceps, the latter comparatively short and weakly specialized with a minute tooth on the ventro-internal margin just beyond the median point.[8]

We find this species first recorded from Hawaii as *"Labidura* sp. not common"[9] and later by Perkins as *Labidura icterica* Serville, from "Oahu, Honolulu and in the country" and from altitudes of a thousand feet or more.

LABIIDAE

LABIINAE

Sphingolabis hawaiiensis (Bormans)

1882. *Forficula hawaiiensis* Bormans, Ann. Mus. Civ. Stor. Nat. Genova, XVIII, p. 341, 3 figures. [♂, ♀; Hawaii.]

Oahu, (A. Koebele), 1 ♀, 1 juv., [Terr. Bd. Agr.].

Koolau Mountains, Oahu, III, 8, 1917, (J. C. Bridwell,) 1 ♀, [Bishop Mus.].

Makaleha Valley, Oahu, XII, 13, 1919, (O. H. Swezey), 1 ♀, [H. S. P. A.].

Mount Tantalus, Oahu, I, 15, 1919, (J. A. Kusche), 1 juv. ♀, [Hebard Coll.].

Waialae-Iki, Oahu, II, 27, 1917, (O. H. Swezey), 1 ♂, 2 ♀, [Bishop Mus.].

Kauai, (A. Koebele), 1 ♂, [Hebard Coll.].

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[8] One male has the sinistral arm of the forceps unspecialized, cylindrical, curving more strongly distad and smaller than the dextral arm, which is normal.

[9] By F. W. Terry. Hawaiian Sug. Pl. Assn., Div. Ent., Bull. No. 1, p. 164, (1905).

Lihue, Kauai, III, 3, 1917, (O. H. Swezey), 2 ♂, 2 ♀, [H. S. P. A. and Hebard Coll.].

Variation in size as well as in the strength of the armament is decided. The extremes of the three males from Kauai measure as follows; length of body 11.7-13.5, length of pronotum 1.55-1.9, width of pronotum 1.55-1.8, length of tegmen 3.2-3.8, exposed length of wing 1.84-1.97, length of forceps 4.2-6.1 mm.

Labia pilicornis (Motschulsky) (Plate xxvi, 3 and 4.)

1863. *Forfiscelia pilicornis* Motschulsky, Bull. Soc. Imp. Nat., Moscou, part 2, p. 2 [♀ ; Nura Ellia Mountains, Ceylon.]

This species is apparently nearest *L. frühstorferi* Burr, described from Lombok. It differs in having the meso-distal portion of the abdomen brown, often as light as the forceps, the almost unicolorous limbs and the moderately prominent though very small male pygidium. From the description we are unable to say whether the female forceps and pygidium show other differences.

The species clearly shows Indo-Malayan, Melanesian or Oceanic, rather than American affinities.

This material was first believed to represent an undescribed species and the following treatment was prepared. We have not deleted this, as the species has never been thoroughly diagnosed.

There is little question that *pilicornis* has been introduced from the Orient.

Kaimuki, Oahu, Hawaii. February 19, 1921. (P. H. Timberlake.)

Description of male: Size very small, form slender. Head microscopically very finely but thickly pilose, shining; weakly cordiform, owing to a very weakly indicated obtuse-angulate emargination of the caudal margin; the medio-longitudinal suture weakly indicated as a bare line in occipital portion. Eyes small, about three-fifths as long as cheeks. Antennae with 13 joints; the first large, as long as the third plus twice the length of the second, expanding suddenly near base, thence with sides parallel; second minute; third elongate, cylindrical, expanding very feebly and evenly distad; fourth elongate ovate, three-quarters as long as the third; the fifth elongate, weakly pyriform, nearly as long as the third; succeeding joints similar, but increasing slightly in length distad, the longest nearly four times as long as broad.

Pronotum shining, thickly though minutely punctulate, these punctulations the sockets of minute but stout hairs, except on convex prozonal portion where the hairs are weaker and absent on the sulci, supplied near cephalic margin with a few bristles; length very slightly less than width; lateral margins parallel, rounding broadly into the broadly convex caudal margin; surface of pronotal portion moderately convex, with a medio-longitudinal linear sulcus and two weaker, shorter sulci on each side, which converge slightly caudad, remaining portions deplanate.

Tegmina about twice as long as pronotum, with apices nearly transverse, showing very faint obliquity; shining, though minutely but thickly punctulate, these punctulations the sockets of minute but stout hairs and with a few bristles latero-cephalad and many along the caudal margin. Exposed portion of wings half as long as tegmina and similarly hairy. Abdomen with dorsal surface shining, supplied with even finer hairs than head; glands absent; distal tergite broadly and weakly impressed meso-caudad, caudal margin transverse, ventral surface more heavily hirsute, penultimate sternite with caudal margin transverse.

Pygidium small, moderately convex declivent to lateral margins and base of apical portion, very slightly longer than broad, lateral margins very weakly concave, convergent to the apex, which is narrow but angulate emarginate, the latero-caudal projections thus formed being minute, acute-angulate. Forceps moderately elongate, as hairy as abdomen, proximal portion nearly straight, strongly triquetrous, distal third flattened oval in cross-section, curving very gently inward to the sharp apex; ventro-internal margin with a minute flange beneath the pygidium, the margin of that flange suddenly and roundly terminated and alone visible from above, remaining portions of ventro-internal margin showing traces of very weak serrulation.[10]

Limbs short, femora stout; first tarsal joint with length very slightly greater than combined length of the minute second and elongate third joints, hairy, its ventral surface with two rows of weak bristles and with an internal fringe of closely placed hairs, arranged in successive lamellate series.

Description of ♀; same data as for ♂, except taken October 28, 1920.

Agrees with male except in the following features. Abdomen broader. Distal abdominal tergite smaller. Pygidium very strongly declivent, narrow, fitting tightly between arms of forceps,[11] its ventral margin narrowly lamellate and horizontal, the caudal margin of this portion transverse between the minute, dentiform, latero-caudal angles, from which the sides of this portion are straight and parallel proximad.

Forceps straight when closed, leaving no intervening space,[12] curving inward slightly at apices; dorsal surface not flat as in male, internal surface deplanate, the ventro-internal margin very minutely and slightly irregularly, microscopically serrulate from base to near apex.

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[10] From this it would appear that some males of the species have this margin supplied with weak and widely spaced serrulations.

[11] The additional portions can only be seen when the forceps are opened to some degree.

[12] In one female the forceps show a weak curvature and in this specimen, when closed, would not fit tightly together throughout.

MEASUREMENT (IN MILLIMETERS)

	Length of body*	Length of pronotum	Width of pronotum	Length of tegmen	Length of forceps
♂					
Kaimuki, Oahu	5	.82	.88	1.35	1.65
Kaimuki, Oahu	4.8	.85	.92	1.36	2.05
♀					
Kaimuki, Oahu	4.3	.75	.82	1.12	1.22
Kaimuki, Oahu	4–4.8	.75–.94	.75–.95	1.15–1.36	1.36–1.41
Waikiki, Oahu	5	.88	.95	1.43	1.36

* As is customary, the length given is exclusive of forceps.

Head, pronotum, tegmina and exposed portions of wings blackish mummy-brown, hairy covering nearly as dark. In one paler specimen, paler and tinged with tawny, the cephalic portion of the pronotum tawny. Abdomen russet, deepening to mummy-brown proximo-laterad. Pygidium and forceps tawny. Antennae, limbs and underparts buckthorn-brown, the ventral surface of the abdomen showing a tawny tinge. In examples of recessive coloration the limbs are somewhat paler.

In addition to the described pair, a series of one male and five females from Kaimuki, Oahu, are before the writer. These were taken by O. H. Swezey and P. H. Timberlake, February 17 to December 18, 1914 to 1921, caught "at light," "in house," and "in a box of apples." Another female was taken at Waikiki, Oahu, by O. H. Swezey, at light.

Labia curvicauda (Motschulsky)

1863. *Forficelisa curvicauda* Motschulsky, Bull. Soc. Nat. Moscou, XXXVI, pt. II, p. 2, Pl. II, fig. 1. [Nura-Ellia mountains, Ceylon.]

Kaimuki, Oahu, V, 1915, (O. H. Swezey, 1 ♂, [H. S. P. A.].

This minute species is known to be widely distributed through the tropical and subtropical regions of the earth.

Labia dubronyi new species. (Plate xxvi, 5 to 7.)

1882. *L*[*abia*] *pygidiata* Bormans, (not of Dubrony, 1879, Ann. Mus. Civ. Stor. Nat. Genova, XVIII, p. 340. [Oahu, Hawaii.]

Since Bormans' first record of this species, from Hawaii as *pygidiata,* material from these islands has been referred incorrectly to that species by all subsequent authors. It has been definitely recorded from Kona, Hawaii, and Perkins has stated that it is "widely distributed; found under the bark of trees in the mountains."

Burr has pointed out the differences between the Hawaiian insect and true *pygidiata,*[13] but did not consider the former distinct. We are convinced that the differences noted fully warrant our present action.

Though closely related to *pygidiata, dubronyi* may readily be separated by the paler and different coloration, decidedly shorter tegmina and wings, male pygidium with interval between distal projections less than that between these and the lateral projections, male forceps with meso-distal tooth the termination of a gradually widening flange and situated ventrad rather than dorsad on the internal surface, and female forceps with internal margins heavily and irregularly serrate in proximal two-thirds, with a moderate and gradually narrowing flange of the ventro-internal margin in distal third and without a trace of median widening.

Both sexes of *pygidiata* have been figured by Dubrony,[14] the female of the present species by Burr.[15]

In certain features, this very much smaller insect shows a somewhat similar development to that found in *Sphingolabis hawaiiensis* (Bormans).

Type: ♂; Hauula, Hawaii. August 2, 1914. (O. H. Swezey.) [Hebard Coll., Type No. 769.]

Size small, form slender. Head with scattered pile and delicate, erect hairs, shining; distinctly but angularly cordiform, owing to the rather abrupt rounding of the latero-caudal portions of the occiput and a broad though distinct obtuse-angulate emargination of the caudal margin; the medio-longitudinal suture weakly indicated in occipital portion. Eyes very small, scarcely over half as long as cheeks. Antennae with 12 or 13 joints; first large, about as long as third plus twice length of second,[16] expanding suddenly at end of proximal third, thence with sides parallel; second minute; third elongate, cylindrical, expanding very feebly and evenly to distal portion; fourth elongate ovate, nearly or quite as long as third; succeeding joints elongate spindle-shaped, increasing very slightly in length but decreasing appreciably in width distad and very small at intersections. (In most specimens the longest joints are three or even four times as long as broad.)

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[13] Fauna Br. India, Dermapt., p. 123, (1910).

[14] Ann. Mus. Stor. Nat. Genova, XIV, p. 365, 3 figures, (1879).

[15] Fauna Br. India, Dermapt., pl. v, fig. 41, (, nec), 1910).

[16] It is clear that slight individual variation occurs in the length of the proximal antennal joints. In some specimens such differences are apparent between the antennae.

Pronotum shining, very minutely impresso-punctulate, these punctulations being the sockets of minute hairs,[17] except in convex prozonal portion where these are much fewer and weaker, supplied latero-cephalad with a few delicate bristles; length appreciably greater than width; lateral margins diverging very slightly caudad, rounding broadly into the very feebly convex, nearly transverse, caudal margin; surface of prozonal portion moderately convex, with a feeble medio-longitudinal linear sulcus and a weak or obsolete impression on each side.

Tegmina appreciably less than twice as long as pronotum, with apices straight, truncate, transverse; surface shining, very minutely impresso-punctulate, the punctulations being the sockets of minute hairs.[18] Exposed tips of wings about one-fourth (averaging this in the series, rarely one-third) as long as tegmina and similarly hairy. Abdomen with dorsal surface shining, supplied with even finer hairs, glands subobsolete; distal tergite with caudal margin very weakly and broadly obtuse-angulate convex above inner portion of each cercal shaft, surface feebly impressed meso-caudad.[19] Lateral portion of abdomen with a scattered supply of delicate bristles, ventral surface as hirsute as dorsal and lateral portions. Penultimate sternite with caudal margin broadly convex laterad and broadly concave mesad.

Pygidium strongly declivent, then flattened out into a large horizontal plate with lateral margins broadly concave divergent to blunt points, which are situated slightly beyond the middle, then broadly concave and convergent to an equal degree to the small, sharply rounded distal apices, between which the distal margin is deeply and roundly emarginate. Forceps moderately elongate, hairy proximad, with many delicate bristles in other portions; straight proximad, flattened internally and weakly dorsad, from this portion showing a very slight inward curvature to the strongly incurved immediate apices, the distal portion strongly flattened oval in cross-section; slightly beyond the pygidium a ventro-internal flange commences, widening gently and evenly and terminating at end of proximal three-fifths in a moderately large acute-angulate tooth, directed ventro-mesad.

Limbs as described for *pilicornis,* except that the metatarsus is slightly longer than the combined length of the succeeding tarsal joints and the bristles on its ventral surface are heavy.

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[17] The hairy covering of this species is not so dense and the hairs are decidedly finer in proportion to the body bulk than in *L. pilicornis,* (Motschulsky).

[18] See footnote 17.

[19] The greater specialization of this tergite in females of *dubronyi* is an unusual occurence in the Dermaptera, the male sex showing the greater specialization in most of the species of the order.

Allotype: ♀ ; same data as type. [Hebard Coll.]

Differs from the male in the following characters. Abdomen broader. Distal tergite with a low and feebly striate, transversely oval convexity above the base of each arm of the forceps and bearing mesad on the caudal margin a small but conspicuously projecting node, directed dorso-caudad.

Pygidium about as wide at base as an arm of the forceps, strongly declivent and showing a strong transverse convexity; with a very narrow, transverse horizontal flange at apex ventrad, terminating on each side in a minute point, which is concealed except when the forceps are somewhat opened.

Forceps well separated, with a weak curvature, as in the male; dorsal surface flattened proximad, narrowing to distal portion and there terminating at the external margin; internal surface deplanate in proximal three-fifths, with dorsal and ventral margins coarsely and irregularly denticulate, thence with ventral margin developed into a weak flange, its margin slightly irregular, terminating near apex of forceps.

MEASUREMENTS (IN MILLIMETERS)

	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Length of forceps
♂					
Hauula, Oahu, *type*	6.5	1.02	.88	2.48	2.58
Ookala, Hawaii, *paratype*	4.6	.88	.81	1.15	2.02
Hawaii, *paratypes* (3)	5.9-7	.85-.95	.82-.88	1.18-1.97	1.88-2.11
♀					
Hauula, Oahu, *allotype*	5.4	1.02	.95	1.33	2.18
Opaeula, Oahu, *paratype*	7.7	1.05	1.02	1.56	2.38
Kuliouou, Oahu, *paratype*	4.5	.76	.74	1.09	1.54
Hawaii, *paratypes* (3)	5.9-6.2	.92-.95	.85-.88	1.27-1.32	1.84-2.18

The great individual size variation, sometimes found in species of Dermaptera, is well exemplified by the females measured.

Head and prozonal portion of pronotum blackish brown, remaining portions of pronotum and all of tegmina translucent honey-yellow, exposed portions of wings similar, but occasionally of a faintly darker shade. Antennae bister. Limbs honey-yellow, median femora suffused proximad with blackish brown, caudal femora very heavily suffused proximad with this color. Abdomen russet; the ultimate tergite rich blackish chestnut-brown. Forceps tawny.

The series before us shows individual variation in the amount of russet entering into the general coloration. Intensification and recession of coloration is also marked. In the maximum recessive examples the distal portion of the abdomen is only very slightly darker than the other portions.

Specimens Examined: 13, 5 males and 8 females.

Hawaii, (A. Koebele), 3 ♂, 3 ♀, *paratypes*, [Terr. Bd. Agr. and Hebard Coll.].
Ookala, Hawaii, X, 18, 1908, (O. H. Swezey), 1 ♂, *paratype*, [H. S. P. A.].
Oahu, (A. Koebele), 1 ♀, *paratype*, [Terr. Bd. Agr.].
Hauula Valley, Oahu, VIII, 2, 1918, (O. H. Swezey), 1 ♂, 1 ♀, *type* and *allotype*, [Hebard Coll.].
Opaeula Gulch, Oahu, III, 30, 1913, (O. H. Swezey), 1 ♀, *paratype*, [H. S. P. A.].
Makaleha Valley, Oahu, XII, 13, 1919, (O. H. Swezey), 1 ♀, *paratype*, [H. S. P. A.].
Kuliouou Valley, Oahu, VI, 25, 1916, (P. H. Timberlake), 1 ♀, *paratype*, [Timberlake Coll.].

Prolabia arachidis (Yersin)

1860. *Forficula arachidis* Yersin, Ann. Sci. Ent. France, (3), VIII, p. 509, pl. X, figs. 33 to 35. [[Adventive at] Marseilles, France.]

Kaimuki, Oahu, I, 8, 1917, (O. H. Swezey; in case of canned tomatoes from Oregon), 2 ♀, [H. S. P. A.]; III, 14, 1914, (O. H. Swezey; in box of apples), 1 ♂, 2 ♀, [H. S. P. A. and Hebard Coll.].
Honolulu, Oahu, (Van Dine), 1 ♀,[20] [U. S. N. M.].

This species, which has been widely distributed by commerce in tropical and subtropical regions, is apparently a recent introduction in Hawaii.

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[20] This specimen was recorded by Burr as *Labia arachidis*, Proc. U. S. Nat. Mus., XXXVIII, p. 453, (1910), constituting the first record for the species from the Hawaiian Islands.

CHELISOCHIDAE

Chelisochinae

Sparattina nigrorufa (Burr) (Plate xxvi, 8 and 9.)

1902. *S[pongiphora] nigrorufa* Burr, Termes. Fuzet., XXV, p. 4, pl. XX, fig. 3. [♂, ♀; Stephansort, Astrolabe Bay and Simbang, Gulf of Huon, New Guinea.]

Hilo, Hawaii, VIII, 21, 1912, (O. H. Swezey; Hilo Sugar Company Plantation), 1 ♂, 1 ♀, [H. S. P. A.[.

Waiakea, Hawaii, III, 31, 1916, (O. H. Swezey), 1 ♂, 1 ♀, [Hebard Coll.].

Careful consideration of the species of several large genera was necessary before we could place this insect. The specimens examined agree closely with the description and comments by Burr on his *Spongiphora nigrorufa* that he assigned later to Spongovostox,[21] though the evidence indicates that Burr assigned other congeneric species to Chaetospania. We have strong evidence to show further that Sparattina, placed by Burr in synonymy under Chaetospania, is valid, including Papuan and Malayan species that he referred to Chaetospania and other genera.

Further study of papers by Burr shows plainly that his concepts of the genera involved were decidedly confused. The material here recorded belongs to the Chelisochinae, as does another Sumatran specimen before us apparently representing a different species of the same genus. Material of two Malagasy species in the Philadelphia Collections, belonging to Chaetospania,[22] are, on the other hand, referable to the Labiinae. Thus the species placed by Burr in the genus Chaetospania are evidently referable to at least two distinct genera, belonging to different families.

The species may be readily recognized by the figures here given. Though in general appearance resembling closely species of Chaetospania, the present material has the second joint of the tarsi provided with a plantula, or narrow lobe, produced beneath the third joint nearly to its median point, a characteristic of the Chelisochidae.

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[21] Since writing the above we find that Burr, in 1915, referred his *nigrorufa,* without comment, to his Chelisochid genus Hamaxas, Tidschr. voor Ent., LVIII, p. 118. It appears very possible that Hamaxas may prove to be a synonym of Sparattina. Genus monotypic. Genotype.—*Sparattina flavicollis* Verhoeff, from Java.

[22] Genus monotypic. Genotype.—*Chaetospania inornata* Karsch, from Madagascar.

Head, pronotum, tegmina, wings, and dorsal surface of abdomen shining black, the latter showing brownish distad in some specimens. Antennae blackish-brown, with one or two joints buffy, preceding the two or three distal joints. Ventral surface of abdomen chestnut brown. Forceps ochraceous-tawny or tawny. Limbs clear, translucent buckthorn-brown.

Length of body ♂ 8-8.5,[23] ♀ 7.9-8.2; length of pronotum ♂ 1.25-1.36, ♀ 1.27-1.43; width of pronotum ♂ 1.15-1.25, ♀ 1.29-1.3; length of tegmen ♂ 2.03-2.09; ♀ 2.31-2.34; length of forceps ♂ 2.72-3.61; ♀ 2.18-2.31 mm.

Chelisoches morio (Fabricius)

1775. *F[orficula] morio* Fabricius, Syst. Ent., p. 270. [Otaheita.]

Hawaii, 4000 feet, V, 8, 1919 (J. A. Kusche), 1 ♂, [Hebard Coll.].

Pukoo, Molokai, I, 1907, (W. M. Giffard), 1 ♂, [H. S. P. A.].

Lanihuli, Oahu, IX, 3, 1916, (J. C. Bridwell), 2 ♀, [Bishop Mus.].

Mount Konahuanui, Oahu, VI, 6, 1919, (J. A. Kusche), 3 ♀, [Hebard Coll.].

Mount Tantalus, Oahu, V, 26, 1919, (J. A. Kusche), 3 ♀. [Hebard Coll.]; XII, 11, 1904, (O. H. Swezey), 1 ♂, 1 ♀, [H. S. P. A.].

Pauoa Ridge, Oahu, V, 29, 1919, (J. A. Kusche), 4 ♂, 1 ♀, [Hebard Coll.].

Pacific Heights, Oahu, XI, 1903, 1 ♀, [Terr. Bd. Agr.]; (O. H. Swezey), 1 ♀, [H. S. P. A.].

Mount Olympus, Oahu, VI, 18 and 23, 1919, (J. A. Kusche), 2 ♂, 3 ♀, [Hebard Coll.].

Palolo, Oahu, VI, 24, 1917, (J. C. Bridwell), 1 ♂, [Bishop Mus.].

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[23] The body length given by Burr, 19 mm., is an error for 9 mm., as shown by the scale given with the figure on the plate.

South side of Oahu, V, 15, 1919, (J. A. Kusche; in center of "Ki," *Dracaena terminalis*, and banana leaves), 1 ♂, 3 ♀, [Hebard Coll.].

We cannot commend too highly the excellent discussion of this species and its life history, given by F. W. Terry in "Leaf Hoppers and Their Natural Enemies."[24]

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[24] Exp. Sta., Hawaiian Sugar Pl. Assn., Div. Ent., Bull. 1, pt. 5, pp. 164 to 171, pls. VIII and IX, (1905).

ORTHOPTERA

BLATTIDAE

Of the sixteen species of cockroaches now known to be in Hawaii, all but one, *Oniscosoma pallida* Brunner,[25] have been treated below. All but two are undoubtedly adventives and these two may have been introduced from the islands of the southern Pacific, where both are found.

Not a single species of cockroach peculiar to Hawaii exists.

ECTOBIINAE

ALLACTA Saussure and Zehntner

1893. Abrodiaeta Brunner, Ann. Mus. Civ. Stor. Nat. Genova, XXXIII, p. 21.

1895. Allacta Saussure and Zehntner, in Grandidier, Hist. Nat. Madagascar, XXIII, p. 45.

Two species were originally referred to Abrodiaeta Brunner, *modesta* and *latipennis*, both described by Brunner. In 1895, Saussure and Zehntner proposed the name Allacta for this genus, as Abrodiaeta Brunner had been found to be preoccupied. The first type designation[26] is invalid, as the species indicated, *lobata* of Saussure, was not mentioned by name in the original generic description. We, therefore, here select *modesta* (Brunner) as genotype of Allacta.

Saussure and Zehntner, in 1895, considered that the genus included two very distinct sections, the first Oriental (and Australasian), the second Malagasy. In 1907, Shelford properly separated these as distinct generic units, describing and naming the Malagasy section Anallacta.[27].

We find that Allacta belongs to an Oriental and Australasian phylum which at the present time is very poorly understood.

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[25] Referred to the Panchlorinae. Recorded by Bormans from Haleakala, Maui, Ann. Mus. Civ. Stor. Nat. Genova, XVII, p. 345, (1883).

[26] Kirby, Syn. Cat. Orth., I, p. 99, (1904).

[27] Gen. Ins., Orth., Blatt., Phyllodromiinae, Fasc. 73, p. 18.

Though widely different in certain features, the genus Eoblatta agrees so closely in other characters that it is clear the two are derived from a common ancestor, more recent than that connecting them with any of the known American forms. This phylum we believe should be placed at or near the end of the Ectobiinae, showing in numerous respects close convergence toward certain types developed in the Pseudomopinae.

In recognizing the genus Allacta the following characters are, we believe, of value. Form moderately broad; tegmina and wings showing some atrophy, not projecting beyond apex of abdomen, often showing some distal truncation and not fully so large in proportion to body bulk in female as in male; discoidal sectors of tegmina weakly oblique. Ventrocephalic margin of cephalic femora armed with a row of spines that are entirely piliform, terminating in two heavy, distal spines. Dorsal surface of male abdomen unspecialized, but conspicuously constricted in distal portion. Large pulvilli present on all four proximal tarsal joints. Arolia present between the simple but strongly asymmetrical tarsal claws.

Allacta similis (Saussure)

= Balta

1869. *Bl[atta] similis* Saussure, Mem. Soc. Phys. Nat. Genève, XX, p. 243. [♂, Australia ?]
1895. *Phyllodromia obtusata* Brunner, Proc. Zoöl. Soc. London, 1895, p. 892. [♀, Kona, etc., Hawaii.]

Kirby, in 1904, first referred *obtusata* to the genus Allacta, a decision that we believe to be fully warranted. After careful consideration of the literature, we feel compelled to place *obtusata* in synonymy under *similis*. Saussure's description is unusually complete and no features are given by which the type can be separated from the Hawaiian material at hand.

Kealakekua, Hawaii, 3000 feet, VIII, 8, 1919, (P. H. Timberlake), 5♂, 1♀, [Timberlake Coll.].

Olaa District, Hawaii, 2500 feet, (W. H. Ashmead), 2♂, [U. S. N. M.]

Ridge south of Iao Valley, West Maui, 2000 feet, VII, 28, 1919, (P. H. Timberlake), 1♀, [Timberlake Coll.].

Mount Kaala, Oahu, 2500 feet, (P. H. Timberlake), 1♂; (J. A. Kusche), 1♂, 2♀, 1 juv., [Hebard Coll.].

Waianae Valley, Oahu, 2800 feet, VI, 1, 1919, (P. H. Timberlake), 1 ♀, [Timberlake Coll.].

Lanihuli, Oahu, III, 26, 1916, (P. H. Timberlake), 1 ♂, [Timberlake Coll.].

Cooke Trail, Oahu, III, 19, 1916, (P. H. Timberlake), 1 ♂, [Timberlake Coll.].

Mount Konahuanui, Oahu, VI, 6, 1919, (J. A. Kusche), 1 ♀, [Hebard Coll.].

Mount Tantalus, Oahu, II, 19, 1916, (P. H. Timberlake), 1 ♂, 1 ♀ with ootheca; V, 26, 1919, (J. A. Kusche) 1 ♀, [Hebard Coll.].

Mount Olympus, Oahu, VI, 23, 1919, (J. A. Kusche), 1 ♂, [Hebard Coll.].

Kauai, 2500 to 4000 feet, III, 26 to IV, 28, 1919, (J. A. Kusche), 11 ♂, 7 ♀, 1 with ootheca, 8 juv., [Hebard Coll.].

In the present species the ventro-caudal margin of the cephalic femora is armed with one or two, and one distal, spines; the ventral margins of the other femora with more numerous, rather weak spines, those of the caudal margins being slightly the heavier.[28]

In specimens of the maximum recessive coloration, the color pattern is very weakly indicated.

EOBLATTA Shelford

1911. *Eoblatta* Shelford, Ent. Monthly Mag., (2), XXII, p. 155.

"Type of the genus: *Blatta notulata* Stål."

The original hurried diagnosis of this genus, referred to the

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[28] In two females which, we believe, represent *Allacta conjuncta* (Walker), from New Zealand, in the Hebard Collection, the limb armament is seen to show decidedly greater atrophy, the margins discussed above armed only with a single distal spine, except the ventro-caudal margins of the median and caudal femora, which are supplied distad with a few additional spines. Brunner's *latipennis* is apparently based on specimens of more than one species, the material from New Zealand very possibly representing the species described by Walker as *conjuncta*.

Group Blattellae of the Pseudomopinae, was apparently based on a misidentification, as material now before us shows the tegminal discoidal sectors to be longitudinal, not oblique, and the ventro-cephalic margins of the cephalic femora to be armed after "type A" and not after "type B".

In size, form and sex contrast close agreement with the Pseudomopine genus Latiblatella Hebard is shown. The present genus is easily distinguished, however, by many features of primary importance as well as by the color pattern, which in the genotype is more highly developed and intricate than in any known species of Latiblattela.

The position of this genus is suggested, under our treatment of the genus Allacta on page 327.

The following features we believe to be of importance in recognizing the genus Eoblatta. Form moderately broad. Tegmina moderately broad; fully developed in male, slightly shorter in female; discoidal sectors longitudinal. Wings with costal veins clubbed and intercalated triangle very small. Dorsal surface of male abdomen unspecialized and not suddenly constricted in distal portion. Ventro-cephalic margin of cephalic femora with a row of spines that decrease suddenly in size mesad, those distad being piliform, terminating in three heavy distal spines; ventro-caudal margin armed with (3 and 1 distal) spines. Large pulvilli on all four proximal tarsal joints. Large arolia present between the simple, asymmetrical tarsal claws, the cephalic being very much shorter than the caudal claw.

Eoblatta notulata (Stål) (Plate XXVI, figure 11.)

1860. *Blatta notulata* Stål, Kongl. Svenska Freg. Eugenie's Resa, Ins., p. 308. [♂, Taiti (= Tahiti).]

1865. *Ph*[*yllodromia*] *hieroglyphica* Brunner, Nouv. Syst. Blatt., p. 105. [♂, ♀: Borneo; Taiti (= Tahiti).]

We are fully in accord with Kirby who, in 1904, indicated the above synonymy, except that the species is certainly not a member of the genus Allacta, to which he assigned it. Shelford, in 1908, also concurred in the synonymy but assigned the species to the genus Phyllodromia.

Stål's description is less satisfactory than that of Brunner, but we are unable to understand Brunner's reason for describing his

Tahitian material as distinct and referring Stål's name, with a query, to a Cambodian species which he described as new.

The species has previously been recorded from Hawaii only under the name *hieroglyphica*.

Hawaii, 4000 feet, V, 8, 1919, (J. A. Kusche), 1 ♂, 1 ♀, [Hebard Coll.].

Makiki Valley, Oahu, V, 7, 1910, (P. H. Timberlake), 1 ♀, [Timberlake Coll.].

Pauoa Ridge, Oahu, V, 29, 1919, (J. A. Kusche), 1 ♂, [Hebard Coll.].

Round Top, Oahu, I, 16, 1916, (P. H. Timberlake), 1 ♀, [Timberlake Coll.].

Mount Olympus, Oahu, V, 18 and 22, 1919, (J. A. Kusche), 5 ♂, 1 ♀, [Hebard Coll.].

Palolo Valley, Oahu, V, 30, 1919, (P. H. Timberlake), 1 ♂, [Timberlake Coll.].

PSEUDOMOPINAE

Blattella germanica (Linnaeus)

1767. [*Blatta*] *germanica* Linnaeus, Syst. Nat., Ed. XII, I, p. 668. [Denmark.]

Honolulu, Oahu, I, 1905, 1 ♂, [Hebard Coll.].

Kaimuki, Oahu, (O. H. Swezey; in house), 1 ♂, [H. S. P. A.].

This cosmopolitan pest has not previously been recorded from the Hawaiian islands.

Symploce hospes (Perkins)

1899. *Phyllodromia hospes* Perkins, Fauna Hawaiiensis, II, p. 5. [♂; Kauai and Honolulu, (Oahu).]

1916. *Symploce lita* Hebard, Trans. Am. Ent. Soc., XLII, p. 357, pl. XVII, fig. 8, pl. XVIII, figs. 1 to 4 [♂, ♀: Key West, Florida; Vera Cruz, Vera Cruz and San José del Cabo, Lower California, Mexico.]

Opportunity to examine Hawaiian material has proved beyond question the synonymy indicated above. The description of *hospes* is insufficient to make determination possible from it alone and the appended statement by Brunner, that the species is allied to *conspersa,* misled us completely; *Phyllodromia conspersa* Brunner is a South American member of the genus Neoblattella, referable to the Group Blatellae, and Symploce is a member of the group Ischnopterae, the genus showing an Epilamprine tendency.

Perkins apparently did not have a specimen of the female, which on account of its deeper color and short, quadrate tegmina, has a very different general facies from the male.

Illingworth has published some interesting notes on this species.[29]

Oahu, II, 10, 1914, (from Illingworth), 1 ♀, [U. S. N. M.]; III, 1913, (from Illingworth), 1 ♂, [U. S. N. M.].

Honolulu, Oahu, VI, 1901, (W. H. Ashmead), 1 ♂, [Hebard Coll.].

Length of body ♂ 11.1-12.8, ♀ 11; length of pronotum ♂ 2.9-3.2, ♀ 3.3; width of pronotum ♂ 3.7-3.8, ♀ 4; length of tegmen ♂ 11.3-12.4, ♀ 3.5; width of tegmen ♂ 3.3-3.8, ♀ 3 mm.

Loboptera sakalava (Saussure)

1891. *T[emnopteryx] sakalava* Saussure, Soc. Ent. Zurich, VI, p. 25. [♀, Madagascar.]

1899. *Loboptera extranea* Perkins, Fauna Hawaiiensis, II, p. 6. [♂, ♀: on the coast, Maui, and Hilo, Hawaii.]

Comparison with the original description and material of *sakalava* from the Comoro Islands and German East Africa, in the collection of the Academy of Natural Sciences of Philadelphia, offers full proof of the synonymy indicated above. In addition, a female is at hand from Tahiti, taken June 6, 1906, by O. E. Brenner, and now in the collection of the United States National Museum.

We refer the species to the genus Loboptera, as comparison with material of the genotype, *L. decipiens* (Germar), in the Philadelphia Academy collection, shows full agreement in the following characters, which we believe define the genus.

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[29] Proc. Hawaiian Ent. Soc., III, p. 138, (1915).

Tegmina greatly reduced, to a similar degree in the sexes. Ventrocephalic margin of cephalic femora armed with a row of stout spines, which decrease gradually in size distad. Pulvilli present on four proximal tarsal joints. Well developed arolia present between the simple and symmetrical tarsal claws. Dorsal surface of male abdomen unspecialized. Interocular space broad. Ocellar spots very small and inconspicuous.

The genus temnopteryx is generally recognized as including forms with short, quadrate tegmina, as opposed to Loboptera, including forms with lobiform, lateral tegmina. We have not been able to examine the genotype of the former, *T. capensis,* but from material of other species at hand, it would appear very probable that Temnopteryx will be found to be a synonym of Loboptera. Hence we think it best to refer *sakalava* to the genus Loboptera. This species, with *L. indica* Brunner, has tegmina intermediate between the two types, these organs overlapping only in their proximal portions, owing to the obliquity of their distal margins.

Hawaii, 4000 feet, V, 8, 1919, (J. A. Kusche), 1 small juv., [Hebard Coll.].

Kaunamano, Hawaii, 1500 feet, 1900, (H. W. Henshaw, 3 ♂, 1 juv. ♂, 1 juv. ♀, [U. S. N. M. and Hebard Coll.].

Honolulu, Oahu, VI, 1901, (W. H. Ashmead), 1 adult, [U. S. N. M.].

The intricate, highly specialized male genitalia are distinctive. In the remarkable subgenital plate the only difference shown by the males at hand is a certain amount of variation in the size of the appendages. The tegminal venation is almost obliterated; the anal sulcus is, however, conspicuous, transverse in its distal half, delimiting distinctly the greatly shortened anal field.

Small immature examples of this species have the antennae dark brown, with a broad whitish annulus distad. In addition to the pale cephalic and lateral borders of the pronotum, the mesonotum is buffy in proximal half and the first abdominal tergite is very narrowly buffy laterad at the cephalic margin.

BLATTINAE

Cutilia soror (Brunner)

1865. *P[olyzosteria] soror* Brunner, Nouv. Syst. Blatt., p. 219. [♂, Amboina.]

Kahoolawe Island, (H. A. Pilsbry), 1 ♂, 2 ♀, [Acad. Nat. Sci. Phila.].

Kawaihapai, Oahu, II, 4, 1913, (H. A. Pilsbry), 1 juv., [Acad. Nat. Sci. Phila.].

This species, originally described from Amboina, is now known to be widely distributed through the islands of the southern Pacific. It was first correctly recorded from Hawaii by Perkins,[30] who also included in his list *Methana ligata* Brunner, possibly mistaking immatures of the present insect for adults of that species. Brunner[31] records *Methana ligata* as from Hawaii on the authority of Bormans, but on turning to the citation[32] we find that *Periplaneta ligata* had instead been recorded. It would appear almost certain that all the Hawaiian records of either *Periplaneta ligata* or *Methana ligata* are properly referable to *Cutilia soror*.

The caudal metatarsus is elongate and biseriately spined beneath, bearing a large distal pulvillus. This feature is characteristic of the genus Cutilia, distinguishing it from the related Platyzosteria—according to Shelford, who, however, placed *soror* in the latter genus,[33] though Kirby had already referred it to Cutilia.[34]

The insect is said to be almost as common in the houses at Honolulu as *P. decorata* (=*Neostylopyga rhombifolia* (Stoll)).

Neostylopyga rhombifolia (Stoll)

1813. [*Blatta*] *rhombifolia* Stoll, Natuur. Afbeeld. Beschr. Spoken, Kakkerlakken, p. 5, register p. 14, pl. IIId, fig. 13. [Apparently an immature female, no locality given.]

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[30] Fauna Hawaiiensis, II, p. 6, (1899), as *Polyzosteria soror*.

[31] Proc. Zoöl. Soc. London, 1895, p. 893, (1895).

[32] Ann. Mus. Civ. Stor. Nat. Genova, XVIII, p. 344, (1883).

[33] Trans. Ent. Soc. London, 1909, p. 256, (1909).

[34] Syn. Cat. Orth., I, p. 134, (1904).

Kahoolawe Island, (H. A. Pilsbry), 1 juv., [Acad. Nat. Sci. Phila.].

Honolulu, Oahu, VI, 1906, 2 ♀, [H. S. P. A.].

Waikiki, Oahu, (W. H. Ashmead), 1 ♀, [U. S. N. M.].

This adventive species appears in the Hawaiian literature as the synonymous *decorata* of Brunner, referred to Periplaneta or Stylopyga. It is generally distributed through the warmer regions of the earth.

Periplaneta americana (Linnaeus)

1758. [*Blatta*] *americana* Linnaeus, Sys. Nat., Ed. X, p. 424. [America.]

Honolulu, Oahu, X, 1906, 1 ♂, [H. S. P. A.].

Periplaneta australasiae (Fabricius)

1775. [*Blatta*] *australasiae* Fabricius, Syst. Ent., p. 271. ["In nave e mare Pacifico et regionibus incognitis revertente."]

Kawaihapai District, Oahu, II, 4, 1913, (H. A. Pilsbry), 1 ♀, [Acad. Nat. Sci. Phila.].

Mount Olympus, Oahu, V, 18, 1919, (J. A. Kusche), 1 juv., [Hebard Coll.].

This, like the preceding species, is a domiciliary adventive. It is, however, more frequently to be found out-of-doors.

Panchlorinae

Leucophaea maderae (Fabricius)

1793. [*Blatta*] *maderae* Fabricius, Ent. Syst., II, p. 6. [Madeira.]

Hilo, Hawaii, VII, 1918, (from U. S. Inspector), 1 ♀, [Hebard Coll.].

The first record of the occurrence of this introduced, domiciliary, tropical species was by Alfken for specimens taken in a native hut at Kalae, Molokai, in 1896 or 1897.[35] Since then it has been recorded as *Rhyparobia maderae:* one from house at Pahala, Hawaii, one from Honolulu, Oahu, and one from Kekaha, Kauai, by Swezey; from a store on Maui, by Wilder; nine from Hilo, Hawaii, by Illingworth, and by Perkins, in 1910, from Maui, Oahu, Molokai and Hawaii.

Pycnoscelus surinamensis (Linnaeus)

1767. [*Blatta*] *surinamensis* Linnaeus, Syst. Nat., Ed. XII, I, p. 687. [Surinam.]

Honolulu, Oahu, XI, 4, 1905, and IV, 1906, 2 ♀, 2 juv. ♀, [H. S. P. A.].

This introduced species was first reported, as scarce, from the vicinity of Honolulu by Bormans, in 1882. The insect is more apt to be found about the habitations of man than indoors.

Nauphoeta cinerea (Olivier)

1789. *Blatta cinerea* Olivier, Encycl. Method., Ins., IV, p. 314. [Adults and juv., L'Ile de France (Mauritius).]

Oahu, XI, 1914, 1 ♂, [Hebard Coll.].

This adventive species appears in the Hawaiian literature usually under Burmeister's synonymic name *bivittata*, though the error has been pointed out by Kirkaldy.[36]

OXYHALOINAE

Diploptera dytiscoides (Serville)

1839. *Blatta dytiscoides* Serville, Hist. Nat. Ins., Orth., p. 102. [♂, ♀; "Nouvelle-Hollande."]

Mount Konahuanui, Oahu, VI, 6, 1919, (J. A. Kusche), 1 ♀, [Hebard Coll.].

Mount Olympus, Oahu, VI, 3, 1919, (J. A. Kusche), 1 ♂, 1 ♀, [Hebard Coll.].

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[35] Zoöl. Jahrb., XIX, p. 565, (1904).

[36] Proc. Hawaiian Ent. Soc., I, p. 88, (1907).

Saussure's genus Diploptera has one year of priority over Brunner's Eleutheroda, under which generic name this species is generally recorded in the literature of Hawaii.

The species is common and injurious in the Territory, infesting particularly the Monterey Cypress trees (*Cupressus macrocarpa* Hartweg) and doing particular damage by gnawing away the bark. Like a number of other species, it is apparently adventive from the islands to the south.

CORYDIINAE

Euthyrrhapha pacifica (Coquebert)

1804. *Blatta pacifica* Coquebert, Ill. Iconogr. Ins., III, p. 91, pl. XXI, fig. 1. [Islands of the Pacific Ocean.]

Honolulu, Hawaii, III, 6, 1904, 1 ♂, [Hebard Coll.].
Kauai, 500 feet, VIII, 1, 1908, (W. H. Ashmead), 1 ♂, [U. S. N. M.].

This insect probably reached the Hawaiian islands by the same route as the preceding species.

Holocompsa fulva (Burmeister)

1838. *C*[*orydia*] *fulva* Burmeister, Handb. Ent., II, Abh. II, pt. I, p. 492. [Egypt.]

Hilo, Hawaii, XI, 24, 1914, 1 ♂,[37] [Univ. of Hawaii].

This specimen, the only one which has been taken in Hawaii, agrees fully with the male described by Brunner,[38] from Khartoum, Kordofan.

Head with face dark chestnut brown, ocelli and mouthparts slightly paler, eyes blackish. Pronotum mummy-brown, antennae and tegmina slightly paler. Ventral surface of cephalic femora and median and caudal coxae chestnut brown, other portions slightly paler, particularly the trochanters and tarsi.

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[37] First recorded by Illingworth, Proc. Hawaiian Ent. Soc., III, p. 254, (1916).

[38] Nouv. Syst. Blatt., p. 348, (1865).

Length of body 4.5, length of pronotum 1.7, width of pronotum 2.2, length of tegmen 4.2 mm.

MANTIDAE

No native species of Mantidae are found in Hawaii; two species have been introduced.

EREMIAPHILINAE

Orthodera ministralis (Fabricius)

1775. *M[antis] ministralis* Fabricius, Syst. Ent., p. 277. [Australia.]

Kilauea, Kauai, IX, 11, 1906, (F. Terry), 1 ♀, [H. S. P. A.].

This species was introduced in a restricted district on the north side of the Island of Kauai and was first recorded, as the synonymous *O. prasina* Burmeister, by Perkins.[39]

MANTINAE

Tenodera sinensis (Saussure)

1871. *T[enodera] aridifolia* var. *sinensis* Saussure, Mélanges Orth., I, p. 419. [♀; Ningpo, China.]

Hawaii, 4000 feet, V, 8, 1919, (J. A. Kusche), 1 ♀, [Hebard Coll.].

This specimen agrees fully with Japanese material of the species before us. It has apparently been recently introduced in Hawaii, probably from Japan. In 1906 Swezey referred to several Mantid oothecae found in the Hamakua District, Hawaii,[40] and at a meeting of the Entomological Society[41] in 1912, Ehrhorn exhibited specimens of oothecae, juvenile and adult of a Japanese mantis. These are certainly referable to the present species.

In 1910 Kirkaldy first records the species correctly from Hawaii as "formerly, reported only from Hamakua and Hilo districts of Hawaii, now present in Kohala, Hawaii,"[42] while the same year Perkins[43] reports it from Hawaii as "now common on the windward side."

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[39] Fauna Hawaiiensis, II, p. 7, (1899).

[40] Proc. Hawaiian Ent. Soc., I, p. 19, (1905).

[41] Proc. Hawaiian Ent. Soc., II, p. 215, (1913).

PHASMIDAE

No walking-sticks are known from Hawaii.

ACRIDIDAE

There are no native species of Grasshopper in Hawaii, though two species have been introduced.

Locustinae

Oxya velox (Fabricius)

1787. *G[ryllus] velox* Fabricius, Mantissa Ins., I, p. 239. [China.]

South side of Oahu, V, 15, 1919, (J. A. Kusche), 1 ♂, [Hebard Coll.].

Pauoa Ridge, Oahu, V, 29, 1919, (J. A. Kusche), 1 ♀, [Hebard Coll.].

Diamond Head, Oahu, V, 23, 1919, (J. A. Kusche; feeding on Passiflora), 1 ♂, 2 ♀, [Hebard Coll.].

This species has been established in Hawaii longer than the other introduced grasshopper, *Atractomorpha ambigua* Bolivar.

Pyrgomorphinae

Atractomorpha ambigua Bolivar

1905. *A[tractomorpha] ambigua* Bolivar, Bol. R. Soc. Espanola Hist. Nat., V, p. 209. [; Shanghai, Kiang-Su, China].

Mount Konahuanui, Oahu, VI, 6, 1919, (J. A. Kusche) 1 ♀, [Hebard Coll.].

Mount Olympus, Oahu, VI, 3, 1919, (J. A. Kusche), 1 ♀, [Hebard Coll.].

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[42] Proc. Hawaiian Ent. Soc. II, p. 95.

[43] Fauna Hawaiiensis, II, p. 689.

South side of Oahu, V, 15, 1919, (J. A. Kusche), 3 ♂, 3 ♀, 1 juv., [Hebard Coll.].

Kauai, III, 26 and IV, 2 and 4, 1919, 3500 and 4000 feet, (J. A. Kusche), 3 ♂, 1 ♀, [Hebard Coll.]

This species is a comparatively recent adventive in Hawaii, having first appeared there, according to Perkins,[44] about 1900. It was first recorded from the Islands in 1906, by Kotinsky, as *A. crenaticeps* Blanchard,[45] identified as that species by Swezey and confirmed by Bruner. Swezey has later given interesting data as to the life history of the species.[46]

At the time those records were published, Bolivar's "Notas sobre los Pirgomórphinos, X, Subfam. Atractomorphinae,"[47] in which *ambigua* was described, had probably not been seen by either Swezey or Bruner.

Comparison of the present material with a series of seven males and ten females from Shanghai, China, in the Hebard Collection, shows conclusively that but one species is represented, the Shanghai topotypes agreeing closely with Bolivar's description, except that the type is apparently a very large individual. F. W. Terry,[48] in his "Notes on Some Insects Observed in South China which are also Common in Hawaii," found the species of Atractomorpha, which was common about Hong Kong and Kowloon, the same as the Hawaiian insect, and recorded it as *crenaticeps*. Though closely related, *ambigua* may be distinguished from *crenaticeps* and *similis* (Bolivar) by the distinctly weaker pronotal carinae and the presence on the pronotal lateral lobes, mesad near the caudal margin, of a small area, which is smooth and colorless.

The species is known only from the islands of Oahu and Kauai, having been first recorded from Kauai as *crenaticeps* by Swezey in 1918.[49]

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[44] Fauna Hawaiiensis, II, p. 687, (1910).

[45] Proc. Hawaiian Ent. Soc., I, p. 38, (1906).

[46] Proc. Hawaiian Ent. Soc., I, p. 106, (1907).

[47] Bol. R. Soc. Espanola Hist. Nat., V, pp. 196-214, (1905).

[48] Proc. Hawaiian Ent. Soc., II, p. 92, (1909).

[49] Proc. Hawaiian Ent. Soc., III, p. 379.

TETTIGONIIDAE

A single native genus, including nine species, now standing as valid in the literature, is known from the Hawaiian islands. In addition there are four species of katydids, representing four more genera, all of which were very probably introduced, though at present one of these is known from the island of Hawaii only.

PHANEROPTERINAE

Elimaea punctifera (Walker)

1869. *Phaneroptera punctifera* Walker, Cat. Dermapt. Saltat. Br. Mus., II, p. 342. [♂, Silhet.]

Hawaii, 4000 feet, V, 8, 1919, (J. A. Kusche), 2 ♂, [Hebard Coll.].

Oahu, V, 24, 1919, (J. A. Kusche), 1 ♂, [Hebard Coll.].

Mount Kaala, Oahu, 4000 feet, VI, 12, 1919, (J. A. Kusche), 1 ♂, 2 ♀, [Hebard Coll.].

Mount Olympus, Oahu, VI, 3, 1919, (J. A. Kusche; feeding on *Dracaena australis*), 1 ♀, [Hebard Coll.].

Diamond Head, Oahu, V, 23, 1919, (J. A. Kusche; feeding on Passiflora), 2 juv. ♂, [Hebard Coll.].

This introduced species is recorded in the Hawaiian literature as the synonymous *E. appendiculata* Brunner, which synonymy was indicated by Kirby in 1906.[50]

Holochlora japonica (Brunner)

1878. *H[olochlora] japonica* Brunner, Monogr. der Phaneropteriden, p. 181. [♂, Japan.][51]

Mount Tantalus, Oahu, V, 26, 1919, (J. A. Kusche), 1 ♂, 1 ♀, [Hebard Coll.].

These specimens fully agree with a series in the collections of the Philadelphia Academy, one male and seven females from

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[50] Syn. Cat. Orth., II, p. 396.

[51] Brunner has subsequently recorded a male of this species from China.

Kyoto, Japan, and five males and two females from Shanghai, China.

The species is one of the most recent introductions in Hawaii. It was first recorded in 1906, with a query, as a species of Microcentrum,[52] from a specimen taken by W. M. Giffard in his house, October 24, 1905, and as *Holochlora venosa* Stål by J. Kotinsky, from Makiki and the Nuuanu Valley,[53] Oahu. At that time it was noted that egg clusters of apparently the same species had been taken in Honolulu, some ten years before.[54]

Stål's *venosa* was described from a Javanese female, Brunner later describing the male sex, also from Javanese material. That species, though agreeing in many features, is separable from *japoinca* by the narrower tegmina, much more deeply cleft male subgenital plate and subemarginate apex of the female subgenital plate.

The female sex of the present species has the subgenital plate triangular, not fully as long as its proximal width, medio-longitudinally carinate and with apex rounded.

Length of body ♂ 24, ♀ 26; length of pronotum ♂ 5.8, ♀ 6.7; length of tegmen ♂ 35, ♀ 45.8; greatest width of tegmen ♂ 7.8, ♀ 11; length of cephalic femur ♂ 6.2, ♀ 7; length of caudal femur ♂ 24.5, ♀ 28.4 mm.

COPIPHORINAE

BANZA Walker

1870. Banza Walker, Cat. Dermapt, Saltat. Br. Mus., III, p. 476.

1888. Microsaga Saussure, Ann. Ent. Soc. France, (6), VIII, p. 154.

1891. Brachymetopa Redtenbacher, Verh. Zool.-Bot. Ges. Wien, XLI, p. 330.

The above synonymy was first pointed out by Kirby, the genotype for each being selected as *parvula* of Walker.[55]

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[52] Proc. Hawaiian Ent. Soc., I, p. 32.

[53] Proc. Hawaiian Ent. Soc., I, p. 126, (1907).

[54] Perkins states that since 1906 the eggs have been found, inserted in the young shoots of trees, Fauna Hawaiiensis, II, p. 687, (1910).

[55] Syn. Cat. Orth., II, p. 254, (1916).

The treatment of the genus by Perkins is the best to be found in the literature.[56] It seems probable that further study will show many of the species to be subdivisible into geographic races, or at least into topomorphs.

The genus Banza shows close similarity in general appearance to the genus Belocephalus, peculiar to the extreme southeastern United States.

Ten species of the genus are recognized by us, their distribution being as follows:

Hawaii. *nitida* (Brunner)
Maui, *brunnea* (Perkins) and *mauiensis* (Perkins)
Lanai. *deplanata* (Brunner)
Molokai. *molokaiensis* (Perkins)
Oahu. *parvula* (Walker) and *unica* (Perkins)
Kauai, *kauaiensis* (Perkins) and *affinis* (Perkins)

Banza parvula (Walker)

1869. *Saga parvula* Walker, Cat. Dermap. Saltat, Br. Mus., II, p. 293, [♂, Oahu.]

1870. *Banza nigrifrons* Walker, Cat. Dermapt. Saltat. Br. Mus., III, p. 477. [♂, Loochoo Islands].[57]

1882. *C[onocephalus] blackburni* Bormans, Ann. Mus. Civ. Stor. Nat. Genova, XVIII, p. 346, 3 figures. [Hawaiian islands.]

1891. *Brachymetopa discolor* Redtenbacher, Verh. Zool.-Bot. Ges. Wien, XLI, p. 431, pl. III, fig. 49. [♂, ♀; Honolulu, Oahu].

The above synonymy, excepting *blackburni,* was first published by Kirby. In 1910,[58] Perkins stated that *discolor* Redtenbacher represented the brown phase, *blackburni* the green phase, of a single species. This conclusion was reached after two days of investigation, during which time a series of forty-seven adult specimens was taken at the same locality.

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[56] Fauna Hawaiiensis, II, pp. 8-13, pl. I, figs. 1-7, pl. II, figs. 1-4, (1899).

[57] Probably due to an error in labelling, the species of this genus being apparently peculiar to the Hawaiian Islands.

[58] Fauna Hawaiiensis, II, p. 687.

Waianae Mountains, Oahu, III, 15, 1910, (O. H. Swezey), 1 green ♀, [H. S. P. A.].

Kalihi, Oahu, III, 15, 1917, (Blackburn; on Freycinetia), 1 green juv. ♀, [Hebard Coll.].

Cooke Trail, Oahu, IX, 9, 1917, (P. H. Timberlake), 1 brown ♂, [Timberlake Coll.].

Mount Tantalus, Oahu, (O. H. Swezey), 1 brown ♂; VIII, 12, 1906, 2 brown ♂; 2000 feet, VIII, 26, 1906, (J. Kotinsky), 1 brown ♀, [H. S. P. A., Terr. Bd. Agr. and Hebard Coll.].

Honolulu, Oahu, (J. Kotinsky), 1 brown ♂, [Terr. Bd. Agr.].

Mount Olympus, Oahu, V, 18, 1919, (J. A. Kusche), 1 green juv.; VI, 3, 1919, (J. A. Kusche) 1 brown ♂, 1 green ♀; VII, 31, 1917, (P. H. Timberlake), 1 green ♂, [Hebard Coll.].

Palolo Crater, Oahu, VII, 31, 1917, (Blackburn), 1 green ♀, [Hebard Coll.].

Palolo Ridge, Oahu, X, 20, 1918, 1 juv. ♀, [H. S. P. A.].

Banza nitida (Brunner)

1895. *Brachymetopa nitida* Brunner, Proc. Zoöl. Soc. London, 1895, p. 894. [♂ ♀; Kona [district] and Mauna Loa at 2000 feet, Hawaii.]

Hawaii, (W. H. Ashmead), 1 ♂, [Hebard Coll.].

Kealakekua, Hawaii, 3500 feet, (P. H. Timberlake), 1 juv. ♂, [Timberlake Coll.].

Hilo, Hawaii, (D. B. Kuhns), 1 ♀, [U. S. N. M.].

Kilauea Volcano, Hawaii, 4000 feet, VII, 21, (W. H. Ashmead), 1 ♂, [U. S. N. M.].

Perkins has described three varieties of this species: *hiloensis, punae* and *crassipes*.[59] Study of large series from the island will show whether these represent geographic races or the less important topomorphs. From the present material it appears probable that *crassipes,* described from Kilauea Volcano at 4000 feet, should be recognized as a geographic race, warranting full trinomial status.

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[59] Fauna Hawaiiensis, II, p. 10, (1899).

In the topotypic specimen before us the tibiae are strikingly heavier than in the other specimens, thickened tibiae being the character given as diagnostic for *crassipes* by Perkins. This race is found at the highest elevation at which individuals of the species have been recorded.

Banza kauaiensis (Perkins)

1899. *Brachymetopa kauaiensis* Perkins, Fauna Hawaiiensis, II, p. 10. [♂, ♀; Makaweli, Kauai, at 2000 feet.]

Kauai, 3500 feet, IV, 1 and 14, 1919, (J. A. Kusche), 1 ♂, 2 ♀; 4000 feet, IV, 2, 1919, (J. A. Kusche), 1 ♀, [Hebard Coll.].

We believe that the present material represents a topomorph of *kauaiensis,* distinguishable from the typical condition by the more elongate tegmina. In the specimens before us these organs are as well developed as in the maximum for *B. nitida* (Brunner). The species is readily distinguished from *nitida* by the shorter and heavier vertex, decidedly finer and more numerous tegminal venation and male cerci, with ventral tooth directed mesad, its apex pointing in the same direction as that of the dorsal tooth. The material before us of both these species has the dorsal margins of the caudal tibiae well supplied with minute spines.

A series of fourteen immature examples, showing both green and brown color phases, apparently represent this species. These were taken by J. A. Kusche on the island of Kauai, between March 26 and April 27, 1919, and are now in the Hebard Collection.

Banza unica (Perkins)

1899. *Brachymetopa unica* Perkins, Fauna Hawaiiensis, II, p. 10. [♀; Mountains near Honolulu, Oahu.]

Mountains of Oahu, summer of 1917, (P. H. Timberlake), 1 ♀, [Hebard Coll.].

Kuliouou, Oahu, XII, 22, 1918, (P. H. Timberlake; on leaves of Clermontia), 1 ♀, [Timberlake Coll.].

The Kuliouou specimen is bright green, the one in the Hebard Collection brown but showing green on the tegmina. Both show clearly the striking facial marking and acute tegmina, characteristic of the species.

As this species was previously known from a single specimen, we give the following measurements for the two females before us: length of body 19.7-22.8, length of pronotum 5.2-5.6, length of tegmen 11.3-10.8, width of tegmen 4-4.2, length of caudal femur 11.4-11.4, length of ovipositor 10.3-11.1 mm.

Listroscelinae

Xiphidiopsis lita new species (Plate xxvi, 12 and 13.)

Without males of this insect we are unable to make as full a comparison as could be desired. The species of the genus, however, show in the female sex differences by which separation may readily be made.

It is hoped that males of *lita* may soon be taken in order that their genitalia, probably showing intricate specialization, may be described and figured.

Many species of *Xiphidiopsis* are found in the tropical Asiatic, Malayan and Melanesian regions, and, although not previously reported from north of the Philippines, unstudied material representing the genus is now before us from as far north as the province of Fukien, China.

Type: ♀; Hilo, Hawaii. August 31, 1919. (O. H. Swezey.) [Hebard Coll., Type No. 771.]

Size medium for the genus. Vertex small, acute, triangularly produced, though with apex bluntly rounded, its dorsal surface very weakly convex and showing a subobsolete medio-longitudinal impressed line. Last joint of maxillary palpus very slightly longer than fourth, enlarging suddenly near the truncate apex.

Pronotum elongate, with dorsal surface very feebly convex, the portion produced caudad about one-third of the total length; lateral margins rounding into lateral lobes, these margins showing very weak and broad concavity meso-proximad, caudal margin forming an arc decidedly less than a semicircle; lateral lobes with cephalic margin broadly convex to ventral angle, which is broadly rounded at slightly more than ninety degrees, caudal margin with a shallow but distinct humeral sinus. Tegmina extending beyond apex of ovipositor, wings surpassing these by slightly more than the pronotal length.

Supra anal plate small and bluntly triangular, fitting into a rounded emargination of the preceding tergite. Cerci simple, cylindrical, over four times as long as greatest width. Ovipositor elongate, with proximal two-fifths swollen, distal portion very weakly curved dorsad, with margins unarmed; dorsal valves acute at apex, ventral valves minutely notched at apex, with immediate apex slightly thickened and decurved. Subgenital plate with free margins convergent, broadly convex and very weakly oblique to median section, where the plate is triangularly produced at slightly less than ninety degrees, with apex rounded, this produced portion as long as its basal width.

Femora and genicular lobes unarmed. Cephalic tibiae with tympanum apert on both faces, four pairs of decided ventral spines and a distal pair of smaller spines. Median tibiae with ventral margins armed with (six) cephalic and (five) caudal spines, which are small. Caudal tibiae with very numerous, minute ventral and fewer, more slender, minute dorsal spines.

General coloration, including the immaculate antennae, light turtle green. Eyes cinnamon-brown. The lateral margins of the pronotal disk are outlined in amber-yellow, these lines continued on the occiput to the eyes.

Owing to the very delicate structure of this insect, specimens often become greenish-yellow when drying.

Length of body[60] 13.2, 10.7-13.2; length of pronotum 4, 3.9-4; width of pronotal disk 1.8, 1.8; length of tegmen 18.7, 18.8-19.8; width of tegmen 2.5, 2.6-2.8; length of caudal femur 10.8, 10.8-11.9; length of ovipositor 8.4, 9-9.7 mm.

In addition to the type, six females from the same locality taken by Pemberton July 15, 1919, and by Swezey April 20, 1920, and August 31, 1919, are designated paratypes. These specimens are in the collection of the Hawaiian Sugar Planters' Association and in the Hebard Collection.

CONOCEPHALINAE

Conocephalus saltator (Saussure)

1859. *X[iphidium] saltator* Saussure, Rev. et Mag. de Zoöl., (2), XI, p. 208. [♀, Guiana.]

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[60] The measurements of the type are given first, followed by the extremes for the paratypic females.

1905. *Xiphidium varipenne* Swezey, Exp. Sta. Hawaiian Sugar Pl. Assn., Div. Ent., Bull. I, pt. 7, p. 216, pl. XIV, 16 figures. [♂, ♀, juv.; Honolulu and elsewhere in the Hawaiian Islands.]

Comparison of Hawaiian specimens with the large American series in the collections of the Philadelphia Academy proves conclusively the synonymy indicated above. At the time *varipenne* was described, the literature on the genus was in great confusion, due largely to the very unsatisfactory treatment in Redtenbacher's "Monographie der Conocephaliden."

The discussion of the species by Swezey, covering twelve pages, is extremely interesting and contains much valuable data.

Rehn and Hebard have more recently shown that *Xiphidium meridionale, propinquum* and *brachypterum* are synonyms of this species.[61]

Previous to Swezey's description of *varipenne,* the species had appeared generally in the Hawaiian literature as *Xiphidium fuscum,* owing to Brunner's original misidentification.

Hawaii, 4000 feet, V, 8, 1919, (J. A. Kusche), 4 ♀ (1 brachypterous), [Hebard Coll.].

Mount Konahuanui, Oahu, VI, 6, 1919, (J. A. Kusche), 1 ♂, 1 ♀ (brachypterous), [Hebard Coll.].

The species appears to have been introduced into Hawaii about 1890, and was reported as occurring "only around Honolulu," in 1899. It is now plentiful and very widely distributed in the Territory.

In the Americas, *saltator* is the most widely distributed and abundant of the tropical species of the genus, occurring from Costa Rica and Montserratt in the West Indies southward to Paraguay.

GRYLLIDAE

The first six species recorded below are probably all adventive in Hawaii, though some of them may have reached the islands before the coming of civilization. The native genus *Paratrigonidium* is represented by ten species in the material before us and most of the sixteen species recognized by Perkins are, we believe, valid. In addition the Prognathogryllides, a group erected by Perkins, is peculiar to Hawaii. We find that three instead of five genera are represented: the first genus by at least three species, possibly by five, the second by one, and the third by a few species but certainly not by eleven, as Perkins supposed.

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[61] Trans. Am. Ent. Soc., XLI, p. 269, (1915).

GRYLLOTALPINAE

Gryllotalpa africana Beauvois

1805. *Gryllo-talpa africana* Beauvois, Ins. Rec. Afr. et Amer., p. 229, pl. Orth. IIc, fig. 6. [♀; "Royaume d'Oware," in present Nigeria, Africa.]

South side of Oahu, V, 15, 1919, (J. A. Kusche), 1 ♀, [Hebard Coll.].

Kauai, 3500 feet, IV, 1, 1919, (J. A. Kusche), 1 ♂, [Hebard Coll.].

These specimens agree closely with material from Japan and from Shanghai, China, in the collections of the Philadelphia Academy. We agree with Hirase[62] in considering Scudder's *G. oryctes,* described from Shanghai, China, a synonym of the present, very widely distributed, species.

The first record of this species in Hawaii outside the island of Oahu was that by Swezey, from Waimea, Kauai.[63]

GRYLLINAE

Gryllodes sigillatus (Walker)

1869. *Gryllus sigillatus* Walker, Cat. Dermapt. Saltat, Blatt. Suppl. Br. Mus., p. 46. [♀; Swan River, [Australia].]

Kahoolawe Island, (H. A. Pilsbry), 1 juv., [A. N. S. P.].

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[62] Monogr. Gryll. Formosa, p. 7, (1911).

[63] Proc. Hawaiian Ent. Soc., III, p. 380, (1917).

Manoa Valley, Oahu, VI, 1901, (W. H. Ashmead), 1 ♂, [U. S. N. M.].

The adult specimen before us shows a very decidedly intensive coloration, the pale cephalic markings being almost obliterated and the pronotal disk darkened cephalad as well as caudad.

This introduced species is common at low elevations in the Hawaiian islands. It has apparently been carried by commerce around the world, being now established in North and South America and the West Indies and having been recorded from Australia, India, Mauritius and Nossi Bé.

The established synonymy of this species is *Gryllus pustulipes* Walker and *Gryllodes poeyi* Saussure. Chopard's *Gryllodes subapterus* is also a synonym, based on a male in the last juvenile instar.

The species has appeared generally in Hawaiian literature under the synonymic name *poeyi*.

Bryllus oceanicus Le Guillou

1841. *Gryllus oceanicus* Le Guillou, Rev. Zoöl., 1841, p. 293.[64] [Nukahiva, Marquesas.]

1869. *Gryllus innotabilis* Walker, Cat. Dermapt. Saltat. Suppl. Blatt. Br. Mus., p. 47. [♂, ♀; Loo Choo [Islands, Japan].]

Hawaii, 4000 feet, V, 8, 1919, (J. A. Kusche), 1 ♂, [Hebard Coll.].

Mount Konahuanui, Oahu, VI, 6, 1919, (J. A. Kusche), 1 ♀, [Hebard Coll.].

Diamond Head, Oahu, V, 23, 1919, (J. A. Kusche), 1 juv., [Hebard Coll.].

Kauai, III, 26 to IV, 16, 1919, (J. A. Kusche), 9 ♂, 8 ♀, 4 juv., [Hebard Coll.].

This insect has long been present and widely distributed in

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[64] Swezey's record of "*Gryllus pacificus*" attacking sugar cane (Proc. Hawaiian Ent. Soc., III, p. 459, (1918), was an error for *oceanicus* and was corrected in the list of errata.

Hawaii and has usually been reported from this region under the synonymic name *innotabilis*.

Saussure states that its range is widespread in Oceania and that it occurs also in Borneo and Japan. One female taken at Sapporo, Japan, is in the collections of the Philadelphia Academy. Like the Japanese material recorded by Saussure, it is darker than the usual type but can be matched by the Hawaiian specimens before us showing the maximum intensification of coloration.

Gryllus conspersus Schaum

1862. *Gryllus conspersus* Schaum, in Peters, Reise nach Mozambique, V, p. 117. [♀, Mozambique.]

Mount Tantalus, Oahu, XII, 11, 1904, (O. H. Swezey), 1♂, [H. S. P. A.]; I, 5, and 8, 1919, (J. A. Kusche), 3♀, [Bishop Mus.].
Honolulu Plantation, Oahu, X, 23, 1914, 1♂, 1♀, [Hebard Coll.].
Niu Valley, Oahu, (O. H. Swezey), 1♀, [H. S. P. A.].
Koko Crater, Oahu, (O. H. Swezey), 1♀, [Hebard Coll.].
Kauai, III, 26 to IV, 11, 1919, (J. A. Kusche), 6♂, 8♀, 3 juv., [Hebard Coll.].
Kokee, Kauai, II, 1919, (J. A. Kusche), 4♂, 3♀, [Bishop Mus.].

This species has not previously been recorded from Hawaii. It has been recorded by Saussure from Africa, Mozambique and the East Indies, and by Shiraki from Formosa. One specimen before us in the Hebard Collection is from the Loo Choo Islands of Japan.

The insect may be readily distinguished from *G. oceanicus* Le Guillou, the other introduced species of the genus in Hawaii, by its decidedly smaller size, head with a narrow but conspicuous transverse buffy line between the ocelli, the vertex in some specimens showing a transverse buff band, and by the more widely separated and sinuate veins of the lateral fields of the tegmina.

MYRMECOPHILINAE

Myrmecophila quadrispina Perkins

1899. *Myrmecophila quadrispina* Perkins, Fauna Hawaiiensis, II, p. 14. [♂, ♀; Honolulu, [Oahu].]

Honolulu, Oahu, XII, 16, 1913, (O. H. Swezey), 1 ♂, [Hebard Coll.].

Waipahu, Oahu, III, 11, 1919, 1 ♀, [Hebard Coll.].

Aiea Valley, Oahu, XI, 19, 1917, 1 juv. ♂, [Hebard Coll.].

The more important characters of this species may be noted as follows:

Dorso-internal margin of caudal tibiae armed with four spines of alternating length, the second twice as long as the first, the third two-thirds as long as the first, and the fourth equalling the second in length. Dorso-external margin of caudal tibiae armed with a single spine, as long as the second spine of the dorso-internal margin. Caudal tibia armed at apex with three pairs of spurs; the ventral pair minute and of equal length; the median pair with external slightly shorter than the internal, which in turn is slightly shorter than the disto-internal spine; the dorsal pair very elongate, with external slightly longer than the internal, the external nearly three-quarters, the internal fully two-thirds, as long as the caudal metatarsus. Dorsal surface of caudal metatarsus armed along the median line with three spinulae, as large as the second (the smallest) spine of the dorso-internal margin of the caudal tibiae, and with two distal spurs, which approximate the length of the distal tarsal joint.

Body blackish mummy-brown, sometimes with pronotal generic spots indistinctly indicated, very slightly paler and more reddish. Antennae buffy, weakly suffused with brown beyond proximal portion. Palpi, cerci, cephalic and median limbs buffy. Caudal femora blackish mummy-brown with genicular areas buffy, caudal tibiae buffy suffused with mummy-brown, the spines and tarsi buffy. The immature example before us is much paler, the darkest portions being clay-colored.

Length of body ♂ 2.24, ♀ 2.92; width of body ♂ 1.36, ♀ 1.77; length of caudal femur ♂ 1.56, ♀ 1.7; width of caudal femur ♂ 1[65] (X 1.56), ♀ 1.05 (X 1.62); length of caudal metatarsus ♂ .75, ♀ .92; length of ovipositor ♀ 1.63 mm.

CYCLOPTILOIDES Sjostedt

1909. Cycioptiloides Sjostedt, Wissensch, Ergeb. Schwed. Zool. Expedit. dem Kilimanjaro, dem Meru, 1905-1906, p. 109.

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[65] With number of times its width is contained in its length added.

1912. Glaphyropus Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1912, p. 189.

We are fully satisfied as to the above synonymy, and in fact the genotype, *C. meruensis* Sjostedt, is very closely related to *americanus* (Saussure), which species was selected as genotype of Glaphyropus. At the time the latter genus was described, the authors had not seen Sjostedt's paper.

Cycloptiloides americanus (Saussure)

1874. *Cycloptilum americanum* Saussure, Miss. Sci. Mex., Rech. Zool., VI, p. 426, pl. VIII, figs. 41 and 42. [Cuba.]

Honolulu, Oahu, (E. M. Ehrhorn), 1 , [Terr. Bd. Agr.]; VI, 1917, (J. C. Bridwell), 1 , [Bishop Mus.].

Kaimuki, II, 26, 1921, (P. H. Timberlake; in rubbish in shed), 2 ♂, 3 ♀, 3 juv. ♂, 1 juv. ♀, [Timberlake and Hebard Colls.]; VII, 20, 1917, (O. H. Swezey), 1 juv. ♂, [H. S. P. A.].

In 1910 this species was first recorded from the Hawaiian islands as *Paranemobius schauinslandi* Alfk., by Perkins, who cancelled his determination in a footnote on the same page.

Trigonidiinae

Paratrigonidium subroseum Perkins

1899. *Paratrigonidium subroseum* Perkins, Fauna Hawaiiensis, II, p. 17. [♂, ♀; Mountains of Oahu, 2000 feet.]

Oahu, (A. Koebele), 2 ♀, [Terr. Bd. Agr.].

Opaeula Valley, Oahu, III, 30, 1913, (O. H. Swezey), 1 ♂, [H. S. P. A.].

Mount Kaala, Oahu, VII, 9, 1913, (O. H. Swezey), 1 ♂, [H. S. P. A.].

Kalihi, Oahu, V, 17, 1914, (O. H. Swezey), 1 ♀, [H. S. P. A.].

Lanihuli, Oahu, X, 25, 1914, (O. H. Swezey), 1 ♂, [H. S.

P. A.]; 2000 feet, IX, 3, 1916, (P. H. Timberlake), 1 ♀, 1 juv. ♂, [Timberlake Coll.].

Cooke Trail, Oahu, VIII, 27, 1916, (P. H. Timberlake), 1 ♂, [Timberlake Coll.].

Mount Konahuanui, Oahu, VI, 23, 1916, (P. H. Timberlake), 1 ♂, 1 juv. ♂, [Timberlake Coll.].

Mount Tantalus, Oahu, V, 30, 1915, (Busck and Swezey), 1 ♂, 1 ♀, [U. S. N. M. and H. S. P. A.]; IV, 7, 1901, (W. M. Giffard), 1 ♂, [Terr. Bd. Agr.]; VI, 10, 1917, (J. C. Bridwell), 1 ♀, [Bishop Mus.].

Mount Olympus, Oahu, X, 1918, (P. H. Timberlake), 1 ♂, [Timberlake Coll.].

Manoa Valley, Oahu, VII, 27, 1913, (O. H. Swezey), 1 ♂, [H. S. P. A.].

Manoa Cliffs, Oahu, IX, 1, 1918, (P. H. Timberlake), 1 ♂, 2 ♀, [Timberlake Coll.].

Palolo Crater, Oahu, IV, 8, 1917 and X, 20, 1918, (P. H. Timberlake, 2 ♂, [Timberlake Coll.].

Palolo Hill, Oahu, IV, 9, 1916, (P. H. Timberlake; on *Freycinetia arborea*), 1 juv. ♂, [Timberlake Coll.].

Palolo Ridge, Oahu, VIII, 14, 1916, (P. H. Timberlake), 1 juv. ♂, [Timberlake Coll.].

Palolo, Oahu, I, 17, 1915, (O. H. Swezey), 1 ♀; VIII, 24, 1906, 1 ♀, [H. S. P. A.].

Waialae Iki, Oahu, V, 2, 1920, (O. H. Swezey), 1 ♀, [H. S. P. A.].

Niu Ridge, Oahu, II, 10, 1918, (P. H. Timberlake), 1 ♂, [Timberlake Coll.[.

The male from Manoa Cliffs has each slender, straight, lateral projection of the genital valves armed with two minute teeth instead of one; the other males of the series have each of these projections unidentate.

Though most of the specimens before us are immaculate in coloration, some show traces of dark markings. In these, a few of the proximal antennal joints are darkened, while the cephalic and median tibiae show faint annulation and the dorsal surface of the caudal femora weak dorsal tessellation proximad. In addition, a few specimens have the lateral lobes of the pronotum somewhat darkened.

Few of the specimens at hand have retained any traces of the pink tinge, said to be shown by living specimens. Strange to say, three or four specimens that have the head, pronotum, and limbs showing a distinct pink tinge appear to have been killed before they had become thoroughly hardened after reaching maturity, though as a rule such material discolors badly in drying.

This species was formerly known only from the mountains of Oahu, and in 1905 was found by its describer on ohia trees.[66]

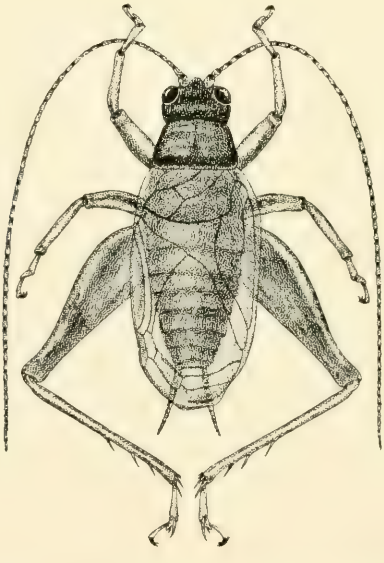

FIGURE 1. *Paratrigonidium roseum* Perkins.

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[66] Proc. Hawaiian Ent. Soc., I, p. 50, (1906).

Paratrigonidium roseum Perkins (fig. 1.)

1899. *Paratrigonidium roseum* Perkins, Fauna Hawaiiensis, II, p. 16, pl. I, fig. 9. [♀, Mountains of West Maui at 3000 feet.]

Iao Valley, Maui, 1500 feet, III, 6, 1909, (W. M. Giffard), 1 ♂, [Hebard Coll.].

This male apparently represents the opposite sex to that of the female described as *roseum*. It is of considerably larger size, however, and additional material from Maui may show the presence on that island of an undescribed species.

In the present specimen the caudal portion of the pronotum is dark, the cephalic portion, head and limbs apparently rose-color in life, the antennae, tegmina and cerci light-yellowish and immaculate.

Length of body 8.7, length of pronotum, 1.35, cephalic width of pronotum 1.85, caudal width of pronotum 2.45, length of tegmen 6.8, width of tegmina 3.7, length of caudal femur 5.9 mm.

The genital valves are retracted and consequently have not been examined in this unique specimen.

Paratrigonidium grande Perkins (Plate xxvii, 1.)

1899. *Paratrigonidium grande* Perkins, Fauna Hawaiiensis, II, p. 19, pl. 1, fig. 12. [♂, ♀: Puna, Kau and Kona Districts, Hawaii.]

Kaumana, Hawaii, X, 25, 1908, 1 ♂, [H. S. P. A.]

Kealakekua, Hawaii, 3000 feet, VIII, 8, 1919, (P. H. Timberlake), 3 ♂, 1 ♀, [Timberlake and Hebard Colls.].

Olaa District, Hawaii, V, 1900, (H. W. Henshaw), 1 ♀; VII, 20, (W. H. Ashmead), 1 juv., [U. S. N. M. and Hebard Coll.].

Kilauea Volcano, Hawaii, V, 20, 1915, (A. Busck), 4 juv., [U. S. N. M. and Hebard Coll.]; 4000 feet, VII, 6, 1910, (W. M. Giffard), 3 ♂, 5 ♀, 1 juv. ♀, [Terr. Bd. Agr. and Hebard Coll.].

The large size of this species readily distinguishes it from the other forms of the genus known from the island of Hawaii.

The lateral projections of the genital valves are moderately heavy and elongate in males of *grande*, curving gently outward and then more strongly inward to the sharp apices. As a result the distal extremity is itself sharp and directed mesad, not bearing on its internal face the minute tooth directed mesad that is characteristic of most of the species of the genus.

The series from Kilauea is recessive in coloration; straw color, with limb markings very weak and in two of the males the triangular area of the tegmina, normally suffused with darker brown, shows but a faint trace of such suffusion.

Paratrigonidium debile Perkins

1899. *Paratrigonidium debile* Perkins, Fauna Hawaiiensis, p. 21. [♂; Mountains of Oahu, 2000 feet and upward.]

Mount Kaala, Oahu, VIII, 11, 1912, and IX, 7, 1913, (O. H. Swezey), 1 ♂, 2 ♀, [H. S. P. A. and Hebard Coll.].

Mount Konahuanui, Oahu, VI, 6, 1919, (J. A. Kusche), 2 ♂, [Hebard Coll.].

Mount Tantalus, Oahu, XI, 25, 1906, (O. H. Swezey), 3 ♂; 1300 feet, I, 21 and II, 25, 1906, (W. M. Giffard) 2 ♂; 1500 feet II, 2, 1906, (W. M. Giffard), 1 ♂; 1800 feet, II, 18, 1906, (W. M. Giffard, 1 ♂; 2000 feet, VIII, 29, 1909, (J. Kotinsky), 1 ♂, [Terr. Bd. Agr., H. S. P. A., Hebard Coll. and U. S. N. M.].

Mount Olympus, Oahu, V, 18, 1919, (J. A. Kusche), 1 ♀, [Hebard Coll.].

This species is evidently close to *P. varians* Perkins, differing in the average shorter and more truncate male tegmina. The general coloration is pale, with limb markings subobsolete or weakly defined. In the male, however, the darkened triangular area of the tegmina is conspicuous.

The contrast between *debile* and *varians* is somewhat analogous to that which exists between the North American species, *Nemobius fasciatus* (DeGeer) and *Nemobius maculatus* Blatchley, though in the present case genitalic differences are not apparent.

Paratrigonidium filicum Perkins (Plate xxvii, 2.)

1899. *Paratrigonidium filicum* Perkins, Fauna Hawaiiensis, II, p. 17, pl. II, fig. 6. [♂, ♀; Olaa (district), Hawaii, at 2000 feet.]

Hawaii, (W. H. Ashmead), 1 ♀, [U. S. N. M.].

Upper Hamakua Trail, Kohala Mountains, Hawaii, IX, 2 and 3, 1919, (O. H. Swezey), 3 ♂, 1 ♀, [H. S. P. A. and Hebard Coll.].

Olaa District, Hawaii, 2000 and 2500 feet, VII, 20, (W. H. Ashmead), 1 ♂, 1 ♀; V, 1900, (H. W. Henshaw), 2 ♀, [U. S. N. M. and Hebard Coll.].

The resemblance of this insect to *P. varians* Perkins is closer than that of any of the four other species of the genus known to occur on the island of Hawaii. The brown coloration, with maculation of the limbs very weakly indicated, is closely approached by individuals of that species showing the maximum of recessive coloration.

The present species averages larger in size, while in the males before us, each slender, straight, lateral projection of the genital valves is heavy and armed at the apex with two very minute teeth.[67]

Paratrigonidium varians Perkins (Plate xxvii, 3 and 4).

1899. *Paratrigonidium varians* Perkins, Fauna Hawaiiensis, II, p. 18. [♂, ♀: Puna [District] at 2000 feet and Kau [District] at 4000 feet, Hawaii; mountains of West Maui; Honolulu at 2000 feet, [Oahu]; Makaweli at 2000 feet, Kauai.]

Kealakekua, Hawaii, 3000 feet, VIII, 8, 1919, (P. H. Timberlake), 1 ♂ intensive, [Timberlake Coll.].

Olaa District, Hawaii, V, 1900, (H. W. Henshaw), 1 ♀, [U. S. N. M.].

Mountain View, Hawaii, III, 31, 1906, 1 ♂ intensive, [H. S. P. A.]

Maui, (A. Koebele), 1 ♂, [Terr. Bd. Agr.].

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[67] One or two minute teeth in this position occur, as a rule, in both *subroseum* and *varians*, but in those species these projections are more delicate and the teeth are considerably more slender and delicate.

Olowalu, Maui, 1200 to 1300 feet, III, 24, 1908, (W. M. Giffard), 1 ♂, [Hebard Coll.].

Halepakai, Lanai, 3400 feet, X, 18, 1907, (W. M. Giffard), 1 ♀,[68] [Hebard Coll.].

Hauula Valley, Oahu, VIII, 2, 1914, 2 ♂, 1 ♀, 1 ♂ intensive, [H. S. P. A. and Hebard Coll.].

Punaluu Valley, Oahu, VI, 11, 1916 and VIII, 9, 1914, (O. H. Swezey), 2 ♂, 2 ♀, 1 ♀, intensive, [H. S. P. A. and Hebard Coll.].

Waiahole Valley, Oahu, III, 28, 1915 and VIII, 13, 1916, (O. H. Swezey) 2 ♂, 1 ♀; X, 20, 1918, (P. H. Timberlake), 1 ♂, 1 ♀, ♀ intensive, [H. S. P. A., Timberlake and Hebard Colls.].

Wahiawa District, Oahu, VII, 4, 1920, (O. H. Swezey, 1 ♀ intensive, [H. S. P. A.].

Mount Kaala, Oahu, III, 4, 1917, (J. C. Bridwell), 1 ♀, intensive, [Bishop Mus.].

Waiawa, Oahu, V 4, 1913, (O. H. Swezey), 1 ♂, [H. S. P. A.].

Nuuanu Pali, Oahu, XI, 19, 1916, (W. M. Giffard), 2 ♀, [Terr. Bd. Agr. and Hebard Coll.].

Kaumuahona Ridge, Oahu, V, 12, 1907 and VI, 6, 1916, (O. H. Swezey), 2 ♂, 2 ♀; VI, 17, 1917, (J. C. Bridwell), 1 ♂; VIII, 27, 1916 and IX, 9, 1917, (P. H. Timberlake), 2 ♀, [H. S. P. A., Bishop Mus., Timberlake and Hebard Colls.].

Mount Tantalus, Oahu, II, 18, 1906, (W. M. Giffard), 1 ♂, 1 ♀; VI, 10, 1917, (J. C. Bridwell), 1 ♀; VI 24, 1907, 1 ♀, all intensive, [Terr. Bd. Agr., Bishop Mus. and H. S. P. A.].

Mount Olympus, Oahu, VII, 2 to X, 20, 1916 to 1918, (P. H. Timberlake), 5 ♀, [Timberlake and Hebard Colls.].

Palolo, Oahu, I, 7, 1915, (O. H. Swezey), 1 ♀; VI, 24, 1917, (J. C. Bridwell), 1 ♀, [H. S. P. A. and Bishop Mus.].

Palolo Ridge, Oahu, IX, 8, 1918, (P. H. Timberlake), 1 ♂, [Timberlake Coll.].

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[68] A gordius worm has partly emerged from this specimen.

Kuliouou Valley, Oahu, VII, 25, 1916 and XII, 22, 1918, (P. H. Timberlake), 2 ♂, [Timberlake and Hebard Colls.].

Kauai, 3500 to 4000 feet, III, 29 to IV, 13, 1919, (J. A. Kusche), 2 ♀, 1 juv., [Hebard Coll.].

The intensively colored specimens have the limb markings heavy and the head and pronotum pale but heavily marked and suffused to varying degrees with very dark brown. Many of the other specimens have the head and pronotum immaculate, rather dark reddish-brown.

In the series from Oahu, a number of females fit the description of *P. exiguum* Perkins, as do the males, except that in none of the males are the tegmina quite so short as 4 mm. The insect is clearly one of the most widely distributed and plastic members of the genus, and the synonymy of *exiguum* appears to be very possible but can not be determined without examination of the pair from the Waianae Mountains (Oahu) upon which that name is based.

Examples of the present species, many showing close superficial resemblance to individuals of *P. pacificum* (Scudder), may be quickly separated from them by the lesser number of veins in the lateral fields of the tegmina and the ovipositor, the transverse suture of which is meso-distad, instead of mesad. The latter type is peculiar to *pacificum,* of the known species of Paratrigonidium.

Paratrigonidium crepitans Perkins

1899. *Paratrigonidium crepitans* Perkins, Fauna Hawaiiensis, II, p. 19. [♂, ♀; Kauai, at 4000 feet.]

Kauai, 3500 and 4000 feet, III, 29 and IV, 1, 1919, (J. A. Kusche), 3 ♀, [Hebard Coll.].

These females differ from those of *P. varians* Perkins before us in their smaller size, with dorsal surface of head, pronotum, and tegmina solidly dark brown, causing the paler lateral margins to be conspicuous.

Paratrigonidium saltator Perkins

1899. *Paratrigonidium saltator* Perkins, Fauna Hawaiiensis, II, p. 16. [♀; Olaa [District], Hawaii, at 2000 feet.]

Moanalua Valley, Oahu, 2000 feet, XII, 31, 1905, (W. M. Giffard), 2 ♀, [Terr. Bd. Agr. and Hebard Coll.].

Nuuanu Pali, Oahu, XI, 16, 1919, (W. M. Giffard), 1 ♀, [Hebard Coll.].

Kaumuahona Ridge, Oahu, IV, 11, 1909, (O. H. Swezey), 1 ♀, [Hebard Coll.].

Palolo, Oahu, I, 3, 1915, (O. H. Swezey), 1 ♂, [Hebard Coll.].

Mount Tantalus, Oahu, II, 2 to XI, 26, 1905 to 1907, (W. M. Giffard), 11 ♂, 9 ♀, [Terr. Bd. Agr. and Hebard Colls.].

Pacific Heights, Oahu, V, 30 and X, 20, 1905, (O. H. Swezey), 2 ♂, [H. S. P. A.].

Waialae Ridge, Oahu, IX, 22, 1917, (P. H. Timberlake), 1 ♂, [Timberlake Coll.].

The solid blackish coloration of the cephalic and median femora and dorsal surface of the caudal femora contrasts strikingly with the pale yellowish brown of the head, antennae, pronotum, tegmina and other portions of the body and limbs in this species. Thus the coloration is striking and in no way to be confused with that of the other species of the genus

It has been stated that *saltator* hides at the bases of the leaves of Freycinetia.

Paratrigonidium atroferrugineum Brunner

1895. *Paratrigonidium atroferrugineum* Brunner, Proc. Zoöl. Soc. London, 1895, p. 895. [♂, ♀; Molokai at 4000 feet.]

Molokai, 2800 feet, X, 27, 1913, (W. M. Giffard; in swamp land), 1 ♂, 1 ♀, [Hebard Coll.].

This, the handsomest known species of the genus, ranks high among the most distinctively and beautifully colored Gryllidae of Earth. The color figure of the male, given by Perkins,[69] is excellent. In the male before us the lateral fields of the tegmina are apricot-yellow, strongly washed with old-rose color in the proximal portions and blackish toward the free (ventral) margin to near the distal portion.

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[69] Fauna Hawaiiensis, II, pl. I, fig. 10, (1899).

This species is said to be found among the leaves of Metrosideros.

Paratrigonidium pacificum (Scudder) (Plate xxvii, 6.)

1868. *Trigonidium pacificum* Scudder, Proc. Boston Soc. Nat. Hist., XII, p. 139. [♀, Hawaiian Islands.]

Kaumana, Hawaii, X, 25, 1908, 1 ♀, [H. S. P. A.]

Hamakua District, Hawaii, IV, 15, 1906, 1 ♀, [H. S. P. A.]

Mount Hualalai, Kona side, Hawaii, VI, 16 and 17, 1905, (J. Kotinsky), 1 ♂, [Terr. Bd. Agr.].

Kealakekua, Hawaii, VIII, 8, 1919, (P. H. Timberlake), 3 ♀, [Timberlake and Hebard Colls.].

Olaa District, Hawaii, 2000 feet, VII, 20, (W. H. Ashmead), 1 ♂, 1 ♀, [U. S. N. M.]

Kilauea Volcano, Hawaii, I, 15 and VII, 1906, (W. M. Giffard), 1 ♂, 4 ♀; V, 20, 1915, (A. Busck), 2 juv., [Terr. Bd. Agr., U. S. N. M. and Hebard Coll.].

Keanae, Maui, VIII, 22, 1918, (O. H. Swezey), 1 ♂, 1 ♀, [H. S. P. A.].

Molokai, 1600 to 2000 feet, X, 30, 1913, (W. M. Giffard; in mountain forest), 1 ♀, [Terr. Bd. Agr.].

Punaluu Valley, Oahu, VI, 11, 1911, (O. H. Swezey), 1 ♂, [Hebard Coll.].

Mount Kaala, Oahu, V, 18, 1920, (O. H. Swezey), 1 ♀; 2500 to 3000 feet, VII, 22, 1917, (Timberlake and Bridwell), 2 ♂, [H. S. P. A., Bishop Mus. and Timberlake Colls.].

Waianae Valley, Oahu, VI, 1, 1919, (P. H. Timberlake), 1 ♀, [Hebard Coll.].

Waiawa, Oahu, VIII, 13, 1916, (P. H. Timberlake), 1 ♂, [Hebard Coll.].

Mount Tantalus, Oahu, I, 14, 1906, (W. M. Giffard), 1 ♀, [Terr. Bd. Agr.]; VI, 24, 1906, 1 ♀, [Hebard Coll.].

Mount Olympus, Oahu, V, 18, 1919, (J. A. Kusche), 1 juv., [Hebard Coll.]

Manoa Valley, Oahu, VII, 27, 1913, (O. H. Swezey), 1 ♂, [H. S. P. A.]

Palolo, Oahu, VIII, 24 and X, 6, 1906, (O. H. Swezey), 2 ♂, [H. S. P. A.].

Palolo Crater, Oahu, IV, 8, 1917, (P. H. Timberlake), 2 ♀, [Timberlake and Hebard Colls.].

Waialae Iki, Koolau Mountains, Oahu, III, 8, 1917, (J. C. Bridwell), 1 ♂, [Bishop Mus.].

Kuliouou Valley, Oahu, VI, 25, 1916, (O. H. Swezey), 1 ♀, [H. S. P. A.].

Kauai, III, 26 to IV, 14, 1919, (J. A. Kusche), 3 ♂, 13 ♀, 2 juv., [Hebard Coll.].

Kalihiwai Valley, Kauai, X, 7, 1906, (W. M. Giffard; from fern), 1 ♀, [Terr. Bd. Agr.].

Variation in size and in strength of the limb markings is shown by the series. The specimens from Kilauea Volcano are the largest.

P. pacificum is distinguished from all other known species of the genus by the greater number of veins in the lateral fields of the tegmina and by genitalic features.

In the male the subgenital plate tapers more strongly distad and the lateral portions curl upward, the genital valves as a rule being wholly concealed. When these project they are seen to be terminated by two stout projections, diverging from the median line and not springing from the external portion of each valve, as do the projections of the genital valves in the other species of Paratrigonidium.

In the female the ovipositor is distinctive in having the transverse suture median in position.

Though this species is said to be largely terrestrial, whereas the other species are thamnophilous or arboreal, the tarsal claws of *pacificum* are similar in having their internal margins armed with from 1 to 4 minute,[70] though well-developed, teeth.

The species is reported as found throughout Hawaii, in the mountain forests and especially in damp and shady places.

ENEOPTERINAE

PROGNATHOGRYLLUS Brunner

1895. Prognathogryllus Brunner, Proc. Zoöl. Soc. London, 1895, p. 896.
1899. Aphonogryllus Perkins, Fauna Hawaiiensis, II, p. 26.
1899. Nesogryllus Perkins, Fauna Hawaiiensis, II, p. 27.

Genotype, selected by Kirby,[71] *Prognathogryllus alatus* Brunner.

The synonymy of Nesogryllus, due to the sexual dissimilarity shown in the genus, was pointed out by Perkins in 1910,[72] having been obscurely indicated in 1906.[73]

Failure to recognize the immature condition resulted in the description of the genus Aphonogryllus. In the earlier instars of Prognathogryllus tegmina and wings are absent, the former alone indicated by lateral lobation of the mesonotum. Moreover, no trace of a tympanum on the cephalic tibiae exists, this being first indicated merely by a slight depression in the later instars and fully developed only in the adult. Noting such dissimilarity, Perkins described Aphonogryllus, based on immature males of the present genus.

In all of the Prognathogryllides the cerci are not longer than the total length of the caudal tarsi, except in females of the present genus, in which they are very much longer than that dimension.

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[70] The smallest of these teeth have evidently been worn off in some examples. This condition may account for the minimum number indicated. In some specimens of *grande,* the largest species of the genus, five such teeth are visible.

[71] Syn. Cat. Orth., II, p. 109, (1906).

[72] Fauna Hawaiiensis, II, p. 689.

[73] Proc. Hawaiian Ent. Soc., I, p. 50.

Prognathogryllus robustus Perkins

1899. *Prognathogryllus robustus* Perkins, Fauna Hawaiiensis, II, p. 25, pl. I, fig. 14. [♀, high central plateau of Kauai.]

Kauai, 3500 and 4000 feet, IV, 1 and 28, 1919, (J. A. Kusche), 1 ♂, 1 ♀, [Hebard Coll.].

Length of body ♂ 16.2, ♀ 17.2; length of pronotum ♂ 3.4, ♀ 3.3; greatest (caudal) width of pronotum ♂ 4, ♀ 3.8; length of tegmen ♂ 13.3, ♀ 8; greatest width of dorsal field of tegmen ♂ 6.2, ♀ 3; length of caudal femur ♂ 8, ♀ 7.7; width of caudal femur ♂ 2.2, ♀ 2.3; length of cercus ♂ 2.8, ♀ 6.6; length of ovipositor 9.3 mm.

Prognathogryllus alatus Brunner (Plate xxvii, 7 and 8.)

1895. *Prognathogryllus alatus* Brunner, Proc. Zoöl. Soc. London, 1895, p. 896, fig. 1. [♀; Waimea Mountains at 4000 feet, Kauai.]

1899. *Aphonogryllus apteryx* Perkins, Fauna Hawaiiensis, II, p. 26, pl. II, figs. 9, 9a, 9b and 9c. [[juv.] ♂; Mountains of Oahu, at 2500 and 3000 feet.]

Failure to recognize as such the early stages of this insect resulted in the above synonymy, further discussed under the generic treatment.

Waianae Mountains, Oahu, III, 15, 1910, (O. H. Swezey), 1 ♀ intensive coloration, [H. S. P. A.].
Lanihuli, Oahu, 2000 feet, X, 19, 1919, (P. H. Timberlake; in hollow twig), 1 juv. ♀, [Timberlake Coll.].
Cooke Trail, Oahu, III, 12, 1916, (P. H. Timberlake; in hollow stem), 1 juv. ♂, [Hebard Coll.].
Malamalama, north slope of Mount Konahuanui, Oahu, VII, 28, 1918, (O. H. Swezey), 1 ♂, 2 ♀, intensive coloration, [H. S. P. A. and Hebard Coll.].

Mount Tantalus, Oahu, III, 11, 1906, (W. M. Giffard), 1 ♂; VIII, 4, 1912 and X, 1, 1911, (O. H. Swezey), 3 juv. ♀; 1200 feet, III, 23, 1907, (W. M. Giffard), 1 ♀; 1500 feet, II, 2, 1906, (W. M. Giffard), 1 ♀; 1800 feet, IX, 15, 1907, (W. M. Giffard), 1 ♀, 1 juv. ♂, intensive coloration; 2000 feet, II, 24, 1906, (W. M. Giffard), 1 ♂, 2 ♀, 3 juv. ♂, (with tegminal and wing pads); 2000 feet, VII, 29, 1909, (J. Kotinsky), 1 ♂, [Terr. Bd. Agr., H. S. P. A., Hebard Coll. and U. S. N. M.].

Mount Olympus, Oahu, VI, 3, 1919, (J. A. Kusche; in hollow branch of Freycinetia), 1 ♀, 1 juv. ♂, (with tegminal and wing pads), intensive coloration, [Hebard Coll.].

Manoa Cliff Trail, Oahu, IX, 1, 1918, (P. H. Timberlake), 1 ♂, [Timberlake Coll.].

Palolo, Oahu, VI, 24, 1917, (J. C. Bridwell), 1 juv. ♂ (without tegminal or wing pads), [Bishop Mus.].

This handsome insect is decidedly the largest species of the genus. Compared with the largest female before us, however, the smallest females are seen to have a very different general facies, due to their great size reduction and recessive coloration. The reduction in limb and cercal length in these, though great, is seen to be less marked than the reduction in ovipositor length.

As a result of the decided size variation in the species, one immature male before us in the first of the instars that show tegminal and wing pads, is no larger than another immature male in the last instar in which the tegminal and wing pads are lacking.

Compared with *P. oahuensis* Perkins, the present insect, though slender, is seen to be much more robust than that species, while the smallest individuals approximate in size the largest of *oahuensis,* both species being subject to very great size variation. Owing to the heavier build, the pronotum of *alatus* is much broader, as is the stridulating area of the male tegmina. In females, the ovipositor of *alatus* varies from slightly longer to over three times as long as the maximum known for *oahuensis.* In addition the present species shows a distinctive and striking color pattern, particularly on the pronotum, except in specimens of the maximum recessive coloration, in which the color contrasts are weakly indicated.

From the present insect, *P. robustus* Perkins is readily distinguished by its broader form, broader stridulating field of the male tegmina, broader female tegmina, proportionately shorter limbs and apparent absence of a striking color pattern.

As no species of the genus has as yet been thoroughly analyzed the following description is here given.

Size large, decidedly variable; form slender. Head with occiput elongate, convex, the interocular area cephalad of that portion flattened, this more decided than in *oahuensis*. Maxillary palpi with fourth joint approximately two-thirds as long as third (approximately three-quarters as long as third in *oahuensis*); fifth joint slightly longer than third, expanding evenly distad, with apex rather strongly obliquely truncate. Antennae stout and very elongate, considerably over twice body length.

Pronotum rounded hexagonal, slightly longer than broad, greatest width meso-caudad, from which point the lateral (ventral) margins converge weakly cephalad and for the brief distance rounded; cephalic and caudal margins transverse, the latter showing a weak trace of angulate production; surface showing a longitudinal rounded ridge on each side, paralleling the lateral margins, separating the somewhat impressed discal portion from the narrow and moderately concave lateral portions of the pronotum, and at the caudal margin the pronotum is thickened and delimited cephalad by a distinct sulcus, paralleling the caudal margin (this condition is very weakly indicated in *oahuensis*).

Tegmina of male as shown in Plate XXVII, 8, reaching to base of supra-anal plate. Tegmina of female considerably longer than pronotum though not twice as long, varying in length, represented by oval pads with apices broadly rounded (much as in *oahuensis*, not as broad distad as in *robustus*), venation distinct. Wings vestigial.

Supra-anal plate triangular, with apex rounded, this more decided in female; dorsal surface concave mesad. Genital valves of male dorso-laterad in position, produced dorso-caudad in elongate, heavy, somewhat irregularly chitinous processes which taper distad and are curved strongly upward at their acute apices, these processes with dorsal portions subchitinous and connected in proximal half with the blunt, short, tongue-like dorso-median portion of the valves by a membranous web. Ovipositor longer than caudal tibia; varying to slightly over half as long as caudal tibia; curved weakly dorsad, varying to straight, with apex very weakly reflexed; apex thickened and grooved. Cerci of female very elongate,[74] nearly as long as ovipositor.

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[74] This and the characters given below, with one exception, are of generic, rather than of specific value.

Femora unarmed. Cephalic and median tibiae with a minute, but stout, dorso-distal spine, the former with an oval, apert tympanum on the cephalic face. Caudal tibia with three small but stout external distal spurs, of which the median is slightly the longer, and with two similar internal distal spurs, of which the dorsal is twice as long as the ventral; dorso-internal margin armed with (6 to 9) long, curved spines, and other minute, irregular spinulae proximad; dorso-external margin armed with more numerous, smaller[75] spines, the dorsal surface between these margins supplied with spinulae.

Coloration of recessive examples ochraceous-buff tinged with ochraceous-tawny. Head ochraceous-tawny, with four, weakly defined, longitudinal lines on occiput of ochraceous-buff, the face russet. Pronotum ochraceous-tawny, with a pair of ochraceous-buff, elongate and nearly rectangular markings, which are situated meso-proximad and diverge strongly caudad, failing to reach the narrowly pale cephalic margin and more broadly pale lateral margins. Abdomen with a transverse line of darker flecks on each tergite, of which the median pair is the heaviest and with distal portion darkened. Limbs more strongly tinged with ochraceous-tawny.

Coloration of intensive examples much sharper and more contrasting. Head shining blackish-brown, with two longitudinal lines on occiput of buffy (the external pair of lines obliterated); palpi, mouthparts and ventral surface buffy. Pronotum blackish brown, with paired markings and margins buffy and in striking contrast. Tegmina tawny. Abdomen and limbs buffy more strongly and extensively marked with blackish brown. Cephalic and median femora distad and tibiae proximad, marked with large flecks of blackish brown. Caudal femora suffused with blackish brown distad, with genicular areas tawny and dorsal surface showing interrupted streaks of blackish-brown. Caudal tibiae with a blackish-brown proximal annulus, dorsal surface blackish-brown except briefly proximad and distad and internal spines and spurs tawny, black tipped.

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[75] In this species the internal spines are proportionately much more elongate than in *oahuensis*.

MEASUREMENTS (IN MILLIMETERS)

♂	Length of body	Length of pronotum	Greatest width of pronotum (at caudal margin)	Length of tegmen	Width of tegmen	Length of caudal femur
Malamalama	27	4.7	5.3	16	6.6	11.3
Mount Tantalus	25	4.5	5	15.9	6.4	11
Mount Tantalus	24	4.2	4.8	15.8	6.2	10
Manoa Cliff Trail	26.3	4.6	5.2	15.7	6.3	11.7

♀	Length of body	Length of pronotum	Greatest width of pronotum (meso-caudad)	Length of tegmen	Width of tegmen	Length of caudal femur	Length of ovipositor
Waianae Mountains	23.8	4.9	4.2	5.8	3.1	12	14.4
Malamalama	27	4.9	4.9	5.8	3.8	12.7	13
Malamalama	24	4.9	4.9	5.8	3.7	12.7	12.7
Mount Tantalus	31	5.3	5.1	7.1	4	13.3	14
Mount Tantalus	28.7	4.7	4.1	6.2	3.3	10.8	7.2
Mount Tantalus	26.7	4.8	4.3	6.4	3.7	11.3	8
Mount Tantalus	28.3	5	4.2	7.7	3.3	11.3	8
Mount Tantalus	23.3	4.2	3.8	5.5	2.9	10.3	7.8
Mount Olympus	35.2	6.3	6	9.2	4.9	16.3	22

Prognathogryllus oahuensis Perkins (Plate xxvii, 9.)

1899. *Prognathogryllus oahuensis* Perkins, Fauna Hawaiiensis, II, p. 25. [♀ ; Waianae Mountains, Oahu.]

1899. *Nesogryllus stridulans* Perkins, Fauna Hawaiiensis, II, p. 27. [♂ ; mountains, Oahu, at 3000 feet.]

Sexual differences, which were supposed to have generic significance, led to the above synonymy.

The small series before us shows that this species is also decidedly variable and there is a possibility that Perkin's *elongatus* and *inexspectatus,* both from Kauai, may represent the same species, in which case the name *elongatus* would have priority. Without examining the types and additional material from Kauai, this problem can not be solved.

Kaumuohona Ridge, Oahu, X, 26, 1913, (O. H. Swezey; from Labordia), 1 ♂, [Hebard Coll.].
Manoa Cliff Trail, Oahu, VIII, 1, 1918, (P. H. Timberlake; in twig of Touchardia), 1 juv. ♀, [Timberlake Coll.].
Palolo Crater, Oahu, V, 18, 1918, (P. H. Timberlake), 1 ♀, [Hebard Coll.].
Palolo, Oahu, 1800 feet, (W. M. Giffard), 1 ♀, [Terr. Bd. Agr.].
Niu Ridge, Oahu, V, 16, 1909, 1 ♀, [Hebard Coll.].
Kuliouou Ridge, Oahu, VI, 25, 1916, (O. H. Swezey), 1 ♀, [H. S. P. A.].

MEASUREMENTS (IN MILLIMETERS)

	Length of body	Length of pronotum	Greatest width of pronotum	Length of tegmen	Width of tegmen	Length of caudal femur	Length of ovipositor
♂							
Kaumuohona	24.8	4.7	4	13.4	4.6	11.4	....
♀							
Palolo Crater	28	4.7	3.7	6.3	3	12	7.6
Palolo	23.2	4.1	3.2	5	2.7	11.1	7.8
Niu	22.8	4	2.8	4.3	2.6	8.7	6
Kuliouou	20	4	3	5	2.2	9.8	6.8

Thaumatogryllus variegatus Perkins

1899. *Thaumatogryllus variegatus* Perkins, Fauna Hawaiiensis, II, p. 27, pl. I, fig. 16. [♂, ♀ ; mountains of Kauai, at 4000 feet.]

Kauai, 1912, (W. M. Giffard), 1 ♀, [Hebard Coll.]

This genus is very close to *Leptogryllus* Perkins, differing only in the deeper and less prognathous head, decidedly longer palpi, more strongly, though very finely, hirsute limbs, closer and more regular minute, but stout, spines of the dorsal margins of the caudal tibiae, more elongate distal spurs of the same, the dorsal of which, both internally and externally, is more than twice as long as the ventral and very much more elongate tarsi.

In both genera the cephalic tibiae are armed with one, the median tibiae with two, very small disto-ventral spines; the cerci are armed with a minute spine,[76] while the female subgenital plate is triangularly produced, with apex truncate.

[76] Stronger in the present specimen than in the examples before us of Leptogryllus, in which genus are found occasional individuals that lack this spine.

Length of body 15, length of pronotum 4.3, greatest (meso-caudal) width of pronotum 3.8, exposed length of tegmen 1.2, width of tegmen 2.8, length of caudal femur 10.8, length of caudal metatarsus 3.1, length of ovipositor 8.5 mm.

LEPTOGRYLLUS Perkins

1899 *Leptogryllus* Perkins, Fauna Hawaiiensis, II, p. 28.

At the time this genus was proposed, the author described seven species, including one previously described by Brunner, and in 1910 three more species were described by Perkins. A series of forty-three specimens now before us, largely from Oahu and Hawaii, shows that here is a problem sufficiently intricate to necessitate extensive collecting, comparison with the types and probably breeding experiments, before the actual number of valid species of this singular Hawaiian genus can be determined.

In the present series at least three groups are found. The first of these has the limbs relatively short and heavily annulate. To this group belongs *forficularis* (Brunner), but whether or not additional species should be recognized we can not say. The second group has the limbs relatively elongate and immaculate. To it belongs *nigrolineatus* Perkins, but the validity of the other species, referable to this type, is as uncertain as in the first group. The third is represented by a single comparatively stout species, with limbs relatively short and showing very weak traces of annuli.

As some smaller immaculate individuals have shorter limbs, these groups are by no means sharply distinguished one from the other, and recession of coloration in the annulate type may cause such annuli almost to disappear, as might be expected. Proceeding further we find that individuals of the first two types have tegmina varying from minute, lateral, and scarcely projecting lobes, to small, but overlapping, lobes, which wholly cover the metanotum. Though each series shows a large proportion of the specimens runing constant to one or the other of these extremes, yet certain individuals are intermediate.

The metanotum of adult males, in which this area is exposed, shows a slight, twin convexity, each side with a median impression. In males with the metanotum nearly or wholly covered by the tegmina, however, we find much higher specialization, as shown on Plate XXVII, 11. This might be considered most important in determining the number of species represented, were it not for the fact that we know tegminal size to be often (though not always) attributable to individual variation within a species, whereas the disappearance of glandular specialization may result solely from tegminal reduction, leaving the otherwise specialized area unprotected.

In length of ovipositor many of the Gryllidae show very great individual variation and in the present genus the extremes to be found in each species are probably decided.

In the immature stages minute, lateral tegminal lobes are present, even at a time when no more than half the adult size has been attained. This fact adds the further difficulty that some of the males, possessing them, though apparently adult, may not be mature and might have had the larger overlapping lobes when adult.

We, therefore, record the material before us as representing but two species and comment on a third, aparently a distinct, form. We believe that, of the eleven species described, most are synonyms, based on features which, though often showing marked differences, will be found on more thorough investigation to be valueless from a specific or even from a racial standpoint. In fact it may develop that but a single plastic species exists, breaking into many more or less intergrading phases.

Several aberrant specimens in the present series, discussed below, would each be described as representing a new species, were the condition as indicated above not understood.

The problem can be adequately worked out only by a student resident in the Hawaiian islands. To one interested in Orthoptera this should prove a most attractive, though difficult, task.

Leptogryllus forficularis Brunner (Plate xxvii, 10 and 11.)

1895. *Prognathogryllus forficularis* Brunner, Proc. Zool. Soc. London, 1895, p. 897. [♀; Kona, Hawaii, at 3000 feet.]

Niulii, Hawaii, V, 22, 1917, (O. H. Swezey), 1 ♀, [Hebard Coll.].

Waimea District, Hawaii, X, 20, 1912, (O. H. Swezey), 1 ♀, [H. S. P. A.].

Olaa District, Hawaii, 2500 feet, (W. H. Ashmead), 1 ♂, 1 ♀, [U. S. N. M.].

Mount Kaala, Oahu, III, 4 to IX, 26, 1916 to 1920, (Swezey; Bridwell), 1 ♂, 3 ♀, [H. S. P. A., Bishop Mus. and Hebard Colls.].

Lanihuli, Oahu, IX, 3, 1916, (J. C. Bridwell), 1 ♂, [Bishop Mus.].

Mount Konahuanui, Oahu, II, 22, 1914, (O. H. Swezey), 1 ♂, [H. S. P. A.].

Kaumuohona Ridge, Oahu, X, 26, 1913, (O. H. Swezey; from Labordia), 1 juv. ?♂, [Hebard Coll.].

Mount Tantalus, Oahu, 2000 feet, XI, 25, 1906, (W. M. Giffard), 1 ♂, [Terr. Bd. Agr.].

Mount Olympus, Oahu, XI, 21, 1909, (O. H. Swezey), 1 ♀; XII, 18, 1910, (O. H. Swezey), 1 juv. ♀, [H. S. P. A. and Hebard Coll.].

Palolo, Oahu, X, 6, 1906, 1 ♀, [H. S. P. A.].

Kauai, 3000 to 4000 feet, IV, 11, and 28, 1919, (J. A. Kusche), 1 ♀, 2 juv. ♂, [Hebard Coll.].

Of the specimens from the island of Hawaii, the Niulii and Olaa District individuals agree closely with the condition described by Perkins as *similis,* the limbs showing scarcely a trace of annulation. The Waimea District female is similar, but has the limbs distinctly annulate, the annuli by no means so deep and contrasting as in most of the specimens from the island of Oahu.

The female from the island of Kauai, and the specimens from Kaumuohona Ridge, Mount Olympus and Palolo, on the island of Oahu, agree rather with the condition described by Perkins as *kauaiensis,* particularly in the tegminal development. That author's *fusconotatus* appears to be based on a larger male of *forficularis,* such as those from Lanihuli and Mount Tantalus, on the island of Oahu, here recorded. In these specimens the metanotum shows a weak median twin convexity, with an impressed point mesad on each side (Plate XXVII, 10). The Kaumuahona, Oahu, male not only appears to be immature but has the metanotum unspecialized. The other two Oahuan males show high metanotal specialization beneath the tegmina (Plate 11, fig. 11). All of the specimens from Oahu and Kauai have conspicuously annulate limbs.

Leptogryllus nigrolineatus Perkins (Plate xxvii, 12.)

1899. *Leptogryllus nigrolineatus* Perkins, Fauna Hawaiiensis, II, p. 28. [♂, ♀; mountains of Oahu and Maui.]

Niulii, Hawaii, V, 22, 1917, (O. H. Swezey), 1 ♂, 1 juv. ♂, 1 juv. ♀, [H. S. P. A.]

Waimea District, Hawaii, X, 20, 1912, (O. H. Swezey), 1 ♀, [H. S. P. A.].

Upper Hamakua Ditch Trail, Kohala Mountains, Hawaii, IX, 3, 1919, (O. H. Swezey; on Cibotium), 2 ♀, [H. S. P. A. and Hebard Coll.].

Kilauea Volcano, Hawaii, 4000 feet, VII, 24, 1906, (W. M. Giffard), 1 ♂, 1 ♀; I, 15, (W. M. Giffard), 1 juv. ♀; II, 12, (W. M. Giffard), 1 ♀, [Terr. Bd. Agr. and Hebard Coll.].

Keanae, Maui, VII, 16, 1920, (O. H. Swezey), 2 ♀, [H. S. P. A. and Hebard Coll.].

Opaeula Valley, Oahu, III, 30, 1913, (O. H. Swezey), 1 ♀, [Hebard Coll.].

Mount Tantalus, Oahu, 1300 feet, X, 27, 1906, (W. M. Giffard), 1 ♂, 2 ♀; 1500 feet, I, 30 and XI, 10, 1906, (W. M. Giffard), 1 ♂, 2 ♀, [Terr. Bd. Agr. and Hebard Coll.].

Waialae Iki, Oahu, V, 2, 1920, (O. H. Swezey), 1 ♂, [Hebard Coll.].

The above series, like that recorded under *forficularis,* includes a variety of forms, which we do not believe should be given either specific or racial status at the present time.

All have much longer legs than the series of *forficularis,* and in none are these members more than very faintly annulate. No trace of annuli is shown in the series from Niulii, Hawaii, Mount Tantalus, and Waialae Iki, Oahu, the adult from the latter locality only having the tibiae almost black. Were such color differences worthy of name, that specimen would, from the description, be considered quite as distinct as Perkins's *apicalis.*

In tegminal development the material of both sexes from Niulii, Hawaii, Mount Tantalus, and Waialae Iki, Oahu, has these organs completely covering the metanotum, that segment greatly specialized as shown on Plate 11, figure 12. Those from Keanae, Maui, show further tegminal reduction, in that these organs overlap, but reach and cover only the proximal portion of the metanotum; the metanotum, apparently as a result, showing depressions but no conspicuous specialization. The female from Opaeula Valley, Oahu, has the tegmina lateral but separated by an interval less than the tegminal width, whereas the rest of the series have minute, lateral tegmina.

The caudal femora, in adults, vary in length from 9.6 to 11.8, the ovipositor from 6.3 to 6.8 mm.

LEPTOGRYLLUS, sp.

Leptogryllus, sp.

A male and an immature male from Mount Olympus, Oahu, taken September 5, 1915, by A. Busck, in the United States National Museum, are of the same general body bulk as the series of *L. nigrolineatus* Perkins, have the limbs immaculate and minute lateral tegmina, but the caudal femora short and stout.

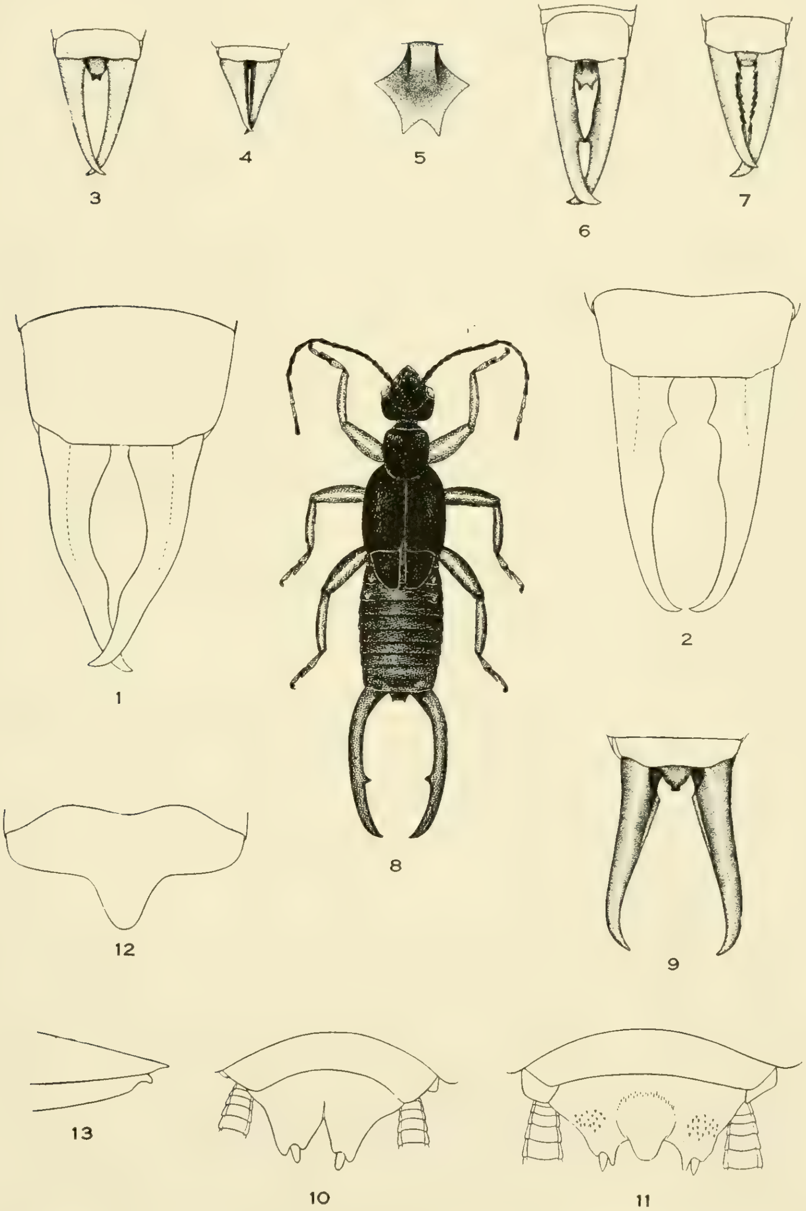
These specimens can not be placed at the present time with any certainty. They have a distinctive facies, are too large for *forficularis* and much too short limbed for *nigrolineatus.*

The measurements of the adult male are: length of body 16, length of pronotum 4, width of pronotum 3.6, exposed length of tegmen 0.4, width of tegmen 0.9, length of caudal femur 9.3, width of caudal femur 2.6 mm.

EXPLANATION OF PLATES

Plate XXVI

1. *Anisolabis perkinsi* Burr. Dorsal outline of apex of male abdomen and forceps. Kauai. (× 8½)
2. *Anisolabis perkinsi* Burr. Dorsal outline of apex of male abdomen and forceps. Kaumana, Hawaii. (× 8½)
3. *Labia pilicornis* (Motschulsky). Dorsal of male forceps and pygidium. Kaimuki, Oahu. (× 8½)
4. *Labia pilicornis* (Motschulsky). Dorsal view of female forceps and pygidium. Kaimuki, Oahu. (× 8½)
5. *Labia dubronyi* new species. Dorsal view of male pygidium. *Type.* Hauula, Oahu. (Greatly enlarged.)
6. *Labia dubronyi* new species. Dorsal view of male forceps and pygidium. *Type.* Hauula, Oahu. (× 7)
7. *Labia dubronyi* new species. Dorsal view of female forceps and pygidium. *Allotype.* Hauula, Oahu. (× 7)
8. *Sparattina nigrorufa* (Burr). Dorsal view of male. Hilo Sugar Company, Hawaii. (× 5)
9. *Sparattina nigrorufa* (Burr). Dorsal view of female forceps and pygidium. Waiakea, Hawaii. (× 9)
10. *Allacta similis* (Saussure). Ventral outline of male subgenital plate. Mt. Kaala, Oahu. (Greatly enlarged.)
11. *Eoblatta notulata* (Stål). Ventral outline of male subgenital plate. Hawaii. (Greatly enlarged.)
12. *Xiphidiopsis lita* new species. Ventral outline of female subgenital plate. *Type.* Hilo, Hawaii. (Greatly enlarged.)
13. *Xiphidiopsis lita* new species. Lateral outline of apex of female ovipositor. *Type.* Hilo, Hawaii. (Greatly enlarged.)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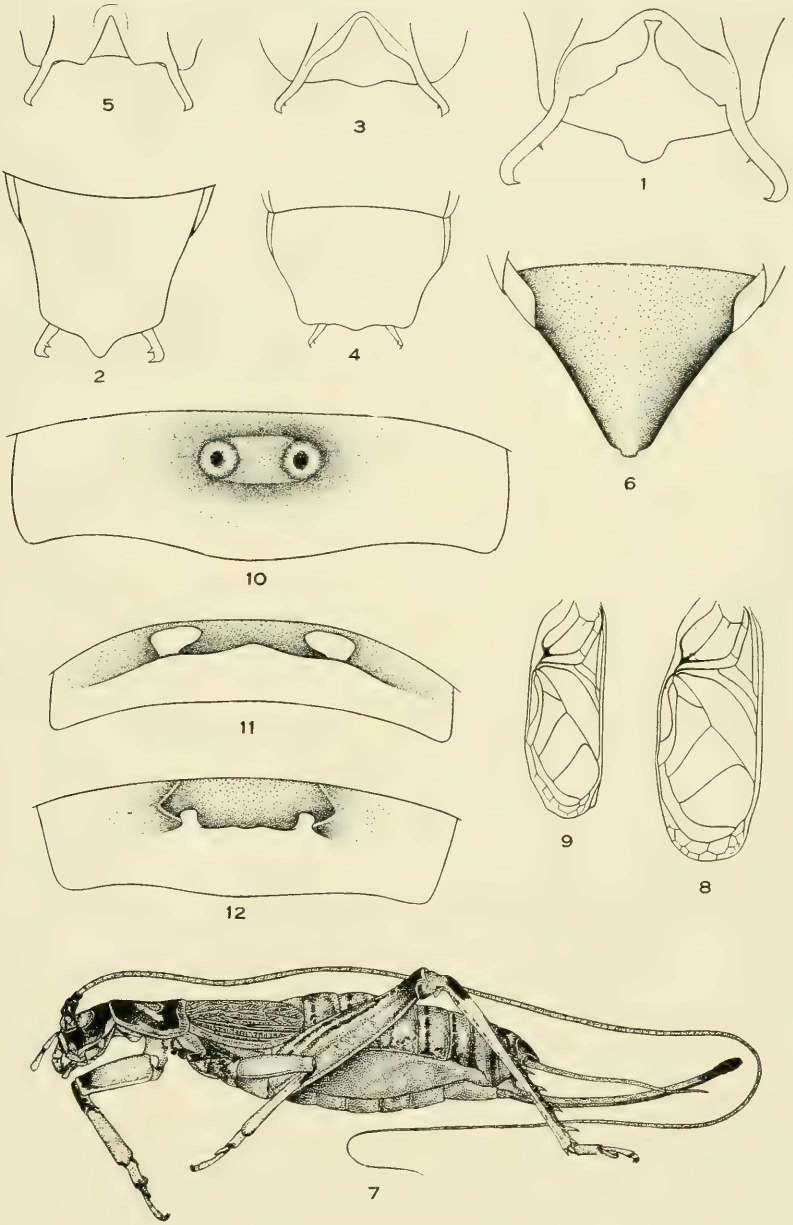
DRAWINGS SHOWING SECTIONS OF HAWAIIAN DERMAPTERA AND ORTHOPTERA. DORSAL VIEW OF SPARATTINA NIGRORUFA.

PLATE XXVII

1. *Paratrigonidium grande* Perkins. Dorsal outline of distal margin of male subgenital plate and distal portion of titillatores. Kealakekua, Hawaii. (Greatly enlarged.)
2. *Paratrigonidium filicum* Perkins. Ventral outline of male subgenital plate and projecting portions of titillatores. Kohala Mountains, Hawaii. (Much enlarged.)
3. *Paratrigonidium varians* Perkins. Dorsal outline of distal margin of male subgenital plate and distal portion of titillatores. Olowalu, Maui. (Same scale as figure 1.)
4. *Paratrigonidium varians* Perkins. Ventral outline of male subgenital plate and projecting portions of titillatores. Olowalu, Maui. (Same scale as figure 2.)
5. *Paratrigonidium saltator* Perkins. Dorsal outline of distal margin of male subgenital plate and distal portion of titillatores. Mount Tantalus, Oahu. (Same scale as figure 1.)
6. *Paratrigonidium pacificum* (Scudder). Ventral view of male subgenital plate. Punaluu, Oahu. (Same scale as figure 2.)
7. *Prognathogryllus alatus* Brunner. Lateral view of largest known female. Mount Olympus, Oahu. (× 1½)
8. *Prognathogryllus alatus* Brunner. Dorsal view of dextral tegmen of male. Manoa Cliff Trail, Oahu. (× 2)
9. *Prognathogryllus oahuensis* Perkins. Dorsal view of dextral tegmen of male. Kaumuahona, Oahu. (× 2)
10. *Leptogryllus forficularis* (Brunner). Dorsal view of metanotum of male, showing reduced specialization in condition lacking tegmina. Mount Tantalus, Oahu. (Greatly enlarged.)
11. *Leptogryllus forficularis* (Brunner). Dorsal view of metanotum of male, showing specialization in condition in which the tegmina almost completely cover this segment. Mount Konahuanui, Oahu. (Same scale as figure 10.)
12. *Leptogryllus nigrolineatus* Perkins. Dorsal view of metanotum of male, showing specialization in condition in which the tegmina completely cover this segment. Mount Tantalus, Oahu. (Same scale as figure 10.)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DRAWINGS SHOWING SECTIONS OF HAWAIIAN ORTHOPTERA. DORSAL VIEW OF PROGNATHOGRYLLUS ALATUS.

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